Environment Canada / Environnement Canada

Guide for Reporting

to the National Pollutant Release Inventory

Canadian Environmental Protection Act, 1999

www.ec.gc.ca/npri

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Guide for Reporting to the National Pollutant Release Inventory

2004

Canadian Environmental Protection Act, 1999

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Disclaimer

Should any inconsistencies be found between this Guide and the official *Canada Gazette* notice and its amendment, the notice published on January 17, 2004, and the amendment published in the *Canada Gazette*, Part I, will prevail.

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Preface

The National Pollutant Release Inventory (NPRI) is at the centre of the Government of Canada's efforts to track toxic substances. It is the only nation-wide, publicly accessible program of its type in Canada that provides information on the release to the environment, disposal and transfers for recycling of pollutants. Since the NPRI's inception in 1992, its role has expanded to include collecting information on pollution-prevention activities.

All non-confidential information collected through the NPRI is available to the public on Environment Canada's Web site at <www.ec.gc.ca/npri> in the form of downloadable databases, reports and analyses, and through a query site which allows the user to view information submitted by individual facilities. Environment Canada normally releases the *unreviewed* data shortly after the reporting deadline; reporters are encouraged to check the Web site frequently to peruse the data.

The NPRI lists 323 substances for the 2004 reporting year. Among them, 231 substances are listed with the original NPRI reporting criteria (10-tonne, manufacture, process and other use reporting threshold with 1% concentration threshold, except for by-products) and 92 substances are listed with alternate reporting criteria – mercury, cadmium, arsenic, lead and their compounds, hexavalent chromium compounds, tetraethyl lead, 17 individual polycyclic aromatic hydrocarbons (PAHs), dioxins and furans, hexachlorobenzene (HCB), seven criteria air contaminants (CACs) and 60 selected volatile organic compounds (VOCs) with additional reporting criteria (VOC speciation).

This Guide, together with its companion documents – *NPRI Software Guide*, *NPRI Toolbox*, *National Pollutant Release Inventory Guidance Manual for the Wastewater Sector*, and *Guidance for Wood Preservation Facilities Reporting to the National Pollutant Release Inventory* – enables facility owners or operators to review the NPRI reporting criteria and determine if they are required to report to NPRI for the 2004 reporting year. These documents also explain how to complete the reporting form and submit a report to Environment Canada.

Since 2001, Environment Canada has worked with the Ontario Ministry of the Environment (ON MOE) to provide one-window reporting for facilities subject to the NPRI *Canada Gazette* notice and Ontario's O.Reg.127/01. A separate guidance document, *Guide for Reporting under O.Reg.127/01 Using the NPRI Software – 2004*, is available on the NPRI reporting software CD to explain the reporting requirements and the reporting form for those facilities in Ontario required to report under O.Reg.127/01. In addition to Environment Canada's collaboration with the ON MOE and in keeping with the spirit of one-window reporting, the NPRI reporting software also enables reporting to Alberta Environment (AENV) to support its *Environmental Protection and Enhancement Act* (EPEA) approvals. Progress is being made toward the development of a one-window reporting system for other municipal, provincial and federal programs. Reporting under other Environment Canada programs is also available, including Environmental Performance Agreements (EPAs). More details on these programs are provided in the *NPRI Software Guide*.

Cette publication est aussi disponible en français sous le titre de « Guide de déclaration à l'Inventaire national des rejets de polluants – 2004 ».

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1. Highlights and Important Changes for 2004

1.1 Report Due Dates

Canada Gazette notice	Reporting Year	Reporting Deadline
January 17, 2004	2004 calendar year	June 1, 2005

An amendment to the Notice was published in the *Canada Gazette*, Part I to revise or clarify certain provisions for the 2004 NPRI reporting year.

1.2 Correspondence

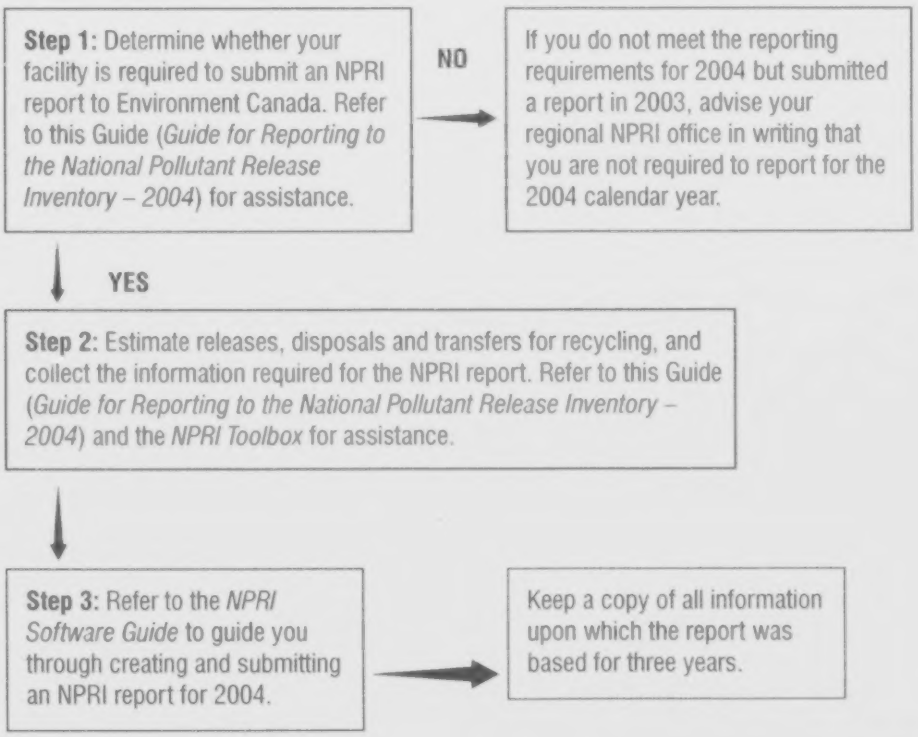
Correspondence from Environment Canada will be addressed to the company coordinator. If there is no coordinator identified, correspondence will be sent to the technical contact. Failure to provide correct telephone and facsimile numbers for the contacts could delay receipt of important notices from NPRI offices. For more information on facility contacts refer to the *NPRI Software Guide*.

1.3 Process for Reporting to the NPRI

This Guide will assist you in determining if you are required to report and, if so, what you are required to report to the NPRI for 2004. Refer to the *NPRI Toolbox* for guidance on estimating releases, disposals and transfers for recycling. Once you have collected the information required for the NPRI report, refer to the *NPRI Software Guide* for assistance on how to enter your information and submit your report. The *NPRI Toolbox* and *Software Guide* are available at NPRI's Web site, <www.ec.gc.ca/npri>. The reporting process is outlined in Figure 1, below.

Figure 1

PROCESS FOR REPORTING TO NPRI FOR 2004


Step 1: Determine whether your facility is required to submit an NPRI report to Environment Canada. Refer to this Guide (Guide for Reporting to the National Pollutant Release Inventory – 2004) for assistance.
NO
If you do not meet the reporting requirements for 2004 but submitted a report in 2003, advise your regional NPRI office in writing that you are not required to report for the 2004 calendar year.
YES
Step 2: Estimate releases, disposals and transfers for recycling, and collect the information required for the NPRI report. Refer to this Guide (Guide for Reporting to the National Pollutant Release Inventory – 2004) and the NPRI Toolbox for assistance.
Step 3: Refer to the NPRI Software Guide to guide you through creating and submitting an NPRI report for 2004.
Keep a copy of all information upon which the report was based for three years.

1.4 Changes for 2004

The only significant change made to NPRI for 2004 concerns the French-translated equivalence for "manufacture, process, or otherwise use (MPO)" – a term commonly used in the NPRI reporting requirements. The French-translated term for process has been revised to distinguish between preparing a substance for distribution in commerce and its preparation before final disposal. More information on the new French equivalent for process, including its definition, is provided in the French version of this Guide.

1.5 Reporting to Other Inventory Programs

Reporting Under Environmental Performance Agreements

In June 2001, Environment Canada published the *Policy Framework for Environmental Performance Agreements.* Environmental Performance Agreements (EPAs) are non-legislative agreements, which meet core design criteria and have been negotiated among parties to achieve specific environmental results. EPAs are voluntary initiatives that stem from Environment Canada's experience with Memoranda of Understanding. To ensure a one-window approach for reporting information to Environment Canada, EPA reporting requirements have been integrated into the NPRI reporting software. For more information on EPAs, visit Environment Canada's Web site at <www.ec.gc.ca/epa-epe>.

Reporting to the Ontario Ministry of the Environment

In May 2001, the Ontario Ministry of the Environment (ON MOE) issued the *Airborne Contaminant Discharge Monitoring and Reporting Regulation* (O.Reg.127/01) under the authority of the *Ontario Environmental Protection Act.* In response to requests from industry for a one-window approach to reporting to inventories, Environment Canada worked with the ON MOE to include the reporting form for O.Reg.127/01 within the NPRI reporting form. Refer to the *Guide for Reporting under O.Reg.127/01 Using the NPRI Software – 2004* for instructions on how to complete the reporting form for O.Reg.127/01. Reference material for reporting to the ON MOE is also provided on the 2004 NPRI reporting software CD.

Reporting to Alberta Environment

In 2002, NPRI started collecting emission information for criteria air contaminants (CACs) on behalf of Alberta Environment (AENV) to support its *Environmental Protection and Enhancement Act* (EPEA) approvals.

Reporting to the National Emissions Reduction Masterplan

The National Emissions Reduction Masterplan (NERM) is an emissions reporting and reduction initiative of the Canadian Chemical Producers' Association (CCPA). The 2004 NPRI reporting software will continue to collect emission information on behalf of NERM. For more information, refer to the *NPRI Software Guide.*

In addition to the above reporting programs, significant progress is being made toward the development of a one-window reporting system that will serve other municipal, provincial and federal programs.

2. Reporting to the National Pollutant Release Inventory for 2004

2.1 Introduction

This Guide provides a general overview of the reporting requirements for all NPRI substances. It will help you to determine whether you are required to report and, if so, what you have to report. The *NPRI Toolbox* will assist you with your calculations. Finally, the *NPRI Software Guide* will guide you through preparing and submitting an NPRI report for the 2004 reporting year.

Facilities that meet wastewater reporting criteria, or that fall within the wood preservation sector, are advised to consult the following companion documents – *National Pollutant Release Inventory Guidance Manual for the Wastewater Sector and Guidance for Wood Preservation Facilities Reporting to the National Pollutant Release Inventory.*

This Guide should be consulted first by owners and/or operators of facilities to determine if they must report for any NPRI substances. Supplementary guides, if applicable, can be consulted following a facility's determination that it must report to Environment Canada for the 2004 NPRI reporting year.

2.2 The Legal Basis for NPRI – Understanding the *Canada Gazette* Notice

The legal basis for the 2004 NPRI is the "Notice with Respect to Substances in the National Pollutant Release Inventory for 2004" and its amendment published in the *Canada Gazette*, Part I. The notice was published on January 17, 2004, under the authority of subsection 46(1) of the *Canadian Environmental Protection Act*, 1999 (CEPA 1999). This notice specifies that any person who owned or operated a facility during the 2004 calendar year, under the conditions prescribed in the notice, must provide certain information to the Minister of the Environment by no later than **June 1, 2005**.

The *Canada Gazette* notice for the 2004 NPRI encompasses a wide range of substances, reporting criteria and requirements. It is divided into four schedules with several parts in each, as outlined below. The contents of the notice and its amendment are explained in this Guide. If you have any difficulties interpreting the requirements of the NPRI notice, contact your regional NPRI office listed inside the front cover of this Guide.

Table 1

OVERVIEW OF THE *CANADA GAZETTE* NOTICE FOR THE 2004 NPRI

Schedule 1 – National Pollutant Release Inventory Substances

Schedule 1 lists all substances in the NPRI, and is broken into five parts according to the reporting criteria for the substances:

- Part 1 lists the 237 substances with a manufacture, process or other use threshold and is divided into four groups according to the threshold quantity,
- Part 2 lists 17 individual polycyclic aromatic hydrocarbons (PAHs),
- Part 3 lists dioxins/furans and hexachlorobenzene (HCB),
- Part 4 lists seven criteria air contaminants (CACs), and
- Part 5 lists 60 selected volatile organic compounds (VOCs) with additional reporting requirements (speciated VOC).

Schedule 2 – Criteria for Reporting

Schedule 2 lists general reporting criteria: Deadline, activities to which the 20 000-hour employee threshold does not apply and exclusions and exemptions:

- Part 1 – reporting criteria for substances listed in Schedule 1, Part 1,
- Part 2 – reporting criteria for the 17 PAHs listed in Schedule 1, Part 2,
- Part 3 – reporting criteria for dioxins/furans and HCB listed in Schedule 1, Part 3,
- Part 4 – reporting criteria for CAC listed in Schedule 1, Part 4, and
- Part 5 – reporting criteria for speciated VOC listed in Schedule 1, Part 5.

Schedule 3 – Types of Information Subject to Notice and Manner of Reporting

Schedule 3 outlines the information that must be submitted by facilities which met the reporting criteria defined in Schedule 2:

- Part 1 – facility information to be reported,
- Part 2 – substance information to be reported for substances listed in Schedule 1, Parts 1 through 3,
- Part 3 – substance information to be reported for CACs listed in Schedule 1, Part 4, and
- Part 4 – substance information to be reported for speciated VOCs listed in Schedule 1, Part 5.

Schedule 4 – Definitions

Schedule 4 provides definitions of several terms used in the notice.

For the purpose of simplifying this reporting Guide:

- **Schedule 1, Part 1, Group 1 substances will be hereafter collectively referred to as Part 1A substances,**
- **Schedule 1, Part 1, Groups 2–4 substances as Part 1B substances,**
- **Schedule 1, Part 2 substances as Part 2 substances,**
- **Schedule 1, Part 3 substances as Part 3 substances,**
- **Schedule 1, Part 4 substances as Part 4 substances, and**
- **Schedule 1, Part 5 substances as Part 5 substances.**

Table 2

OVERVIEW OF SUBSTANCES AND THRESHOLDS FOR REPORTING TO THE 2004 NPRI

Part Number	Substance	Mass Threshold	Concentration Threshold	Unit for Reporting
Threshold Based on Quantity Manufactured, Processed or Otherwise Used				
1A	231 core substances	10 tonnes	1%	tonnes
1B	mercury[1]	5 kg	n/a	kg
	cadmium[1]	5 kg	0.1%	kg
	arsenic[1] hexavalent chromium compounds lead[2] tetraethyl lead	50 kg	0.1%	kg
Polycyclic Aromatic Hydrocarbons (PAHs) – Threshold Based on Special Criteria				
2	17 individual PAHs	incidental manufacture and release, disposal or transfer for recycling of 50 kg total, or any quantity for wood preservation using creosote	n/a	kg
Dioxins/Furans and Hexachlorobenzene (HCB) – No Threshold. Obligatory Reporting for Facilities Used for or Engaged in Specific Activities				
3	dioxins/furans HCB	activity-based	n/a	g TEQ[3], g
Criteria Air Contaminants (CACs) – Threshold Based on Quantity Released to Air				
4	carbon monoxide oxides of notrogen sulphur dioxide total particulate matter	20 tonnes	n/a	tonnes
	volatile organic compounds	10 tonnes	n/a	tonnes
	PM_{10}[4]	0.5 tonnes	n/a	tonnes
	$PM_{2.5}$[5]	0.3 tonnes	n/a	tonnes
Speciated Volatile Organic Compounds (VOCs) – Additional Reporting Requirements				
5	60 VOCs including individual substances, isomer groups and other groups and mixtures	1 tonne of 10-tonne air release threshold for VOCs (Part 4) has been met	n/a	tonnes

n/a – not applicable

[1] and its compounds

[2] and its compounds, except tetraethyl lead (CAS No. 78-00-2); does not include lead (and its compounds) contained in stainless steel, brass or bronze alloys

[3] See 4.8.1, "What Are Toxic Equivalents (TEQs) of Dioxins/Furans" for an explanation of these units

[4] See glossary for definition of PM_{10}

[5] See glossary for definition of $PM_{2.5}$

3. Step 1 – Determine Whether a Report is Required for Your Facility

The first step is to determine whether your facility is required to report to NPRI for any of the listed substances. This section outlines the reporting criteria for all substances listed in NPRI for 2004. If you are required to report, refer to Section 4 for details on where to find guidance and information on how to estimate releases, disposals and transfers for recycling of the substances listed in NPRI. A number of question and answers, indexed by subject keyword, are also available at the end of this Guide to answer your more general NPRI-related inquiries.

3.1 Overview of Reporting Criteria

The substances listed in the 2004 NPRI are divided into five parts, according to their differing sets of reporting criteria. The complete list of NPRI substances is provided in Appendix 1, and is shown subdivided into these five parts.

It is the facility's obligation to review NPRI reporting criteria annually, as they are subject to change. If a report was filed for 2003 but the facility does not meet the 2004 NPRI criteria, it must inform Environment Canada, in writing, of its change in reporting status.

Figure 2 provides an overview of the reporting criteria for the 2004 NPRI. Detailed explanations of the reporting criteria and requirements for each group of substances follow the figure.

Figure 2:

CRITERIA FOR REPORTING TO NPRI FOR 2004

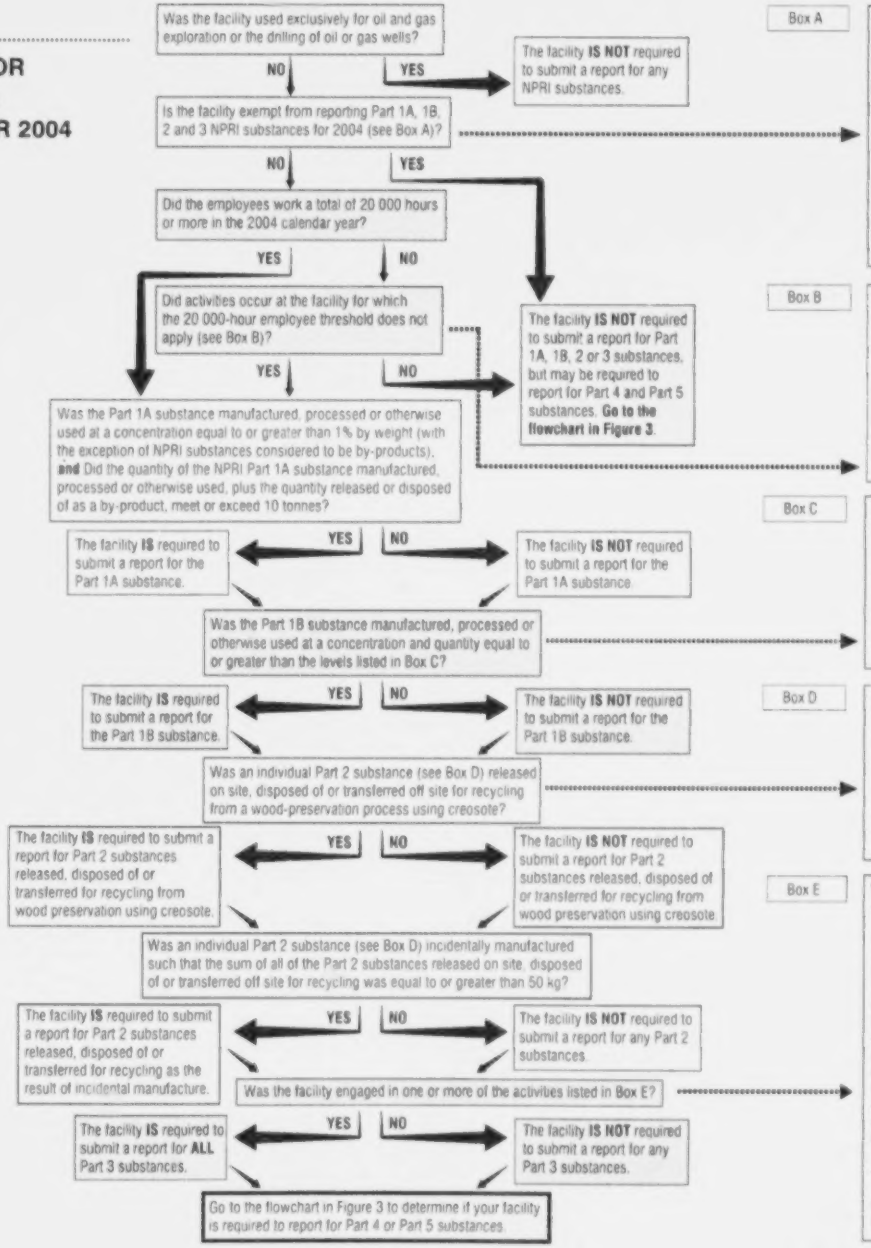
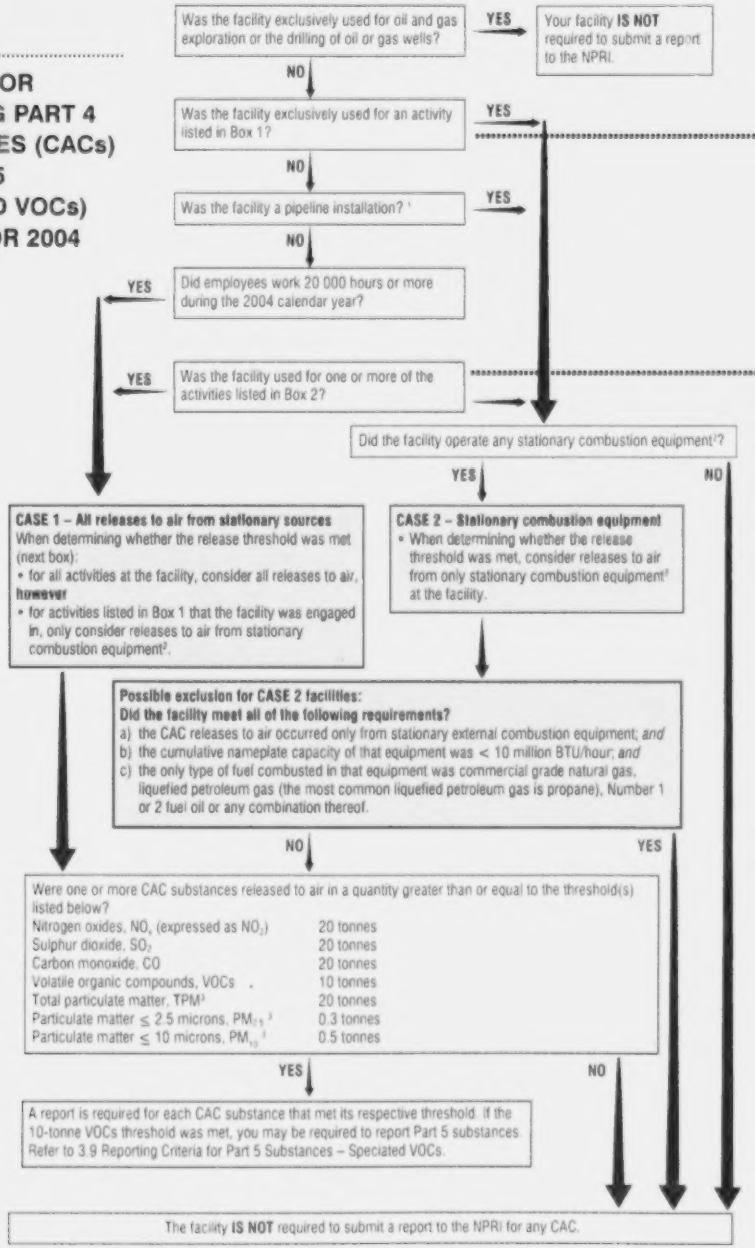

Was the facility used exclusively for oil and gas exploration or the drilling of oil or gas wells?
NO
YES
The facility IS NOT required to submit a report for any NPRI substances.
Is the facility exempt from reporting Part 1A, 1B, 2 and 3 NPRI substances for 2004 (see Box A)?
NO
YES
Did the employees work a total of 20 000 hours or more in the 2004 calendar year?
YES
NO
Did activities occur at the facility for which the 20 000-hour employee threshold does not apply (see Box B)?
YES
NO
The facility IS NOT required to submit a report for Part 1A, 1B, 2 or 3 substances, but may be required to report for Part 4 and Part 5 substances. Go to the flowchart in Figure 3.
Was the Part 1A substance manufactured, processed or otherwise used at a concentration equal to or greater than 1% by weight (with the exception of NPRI substances considered to be by-products), and Did the quantity of the NPRI Part 1A substance manufactured, processed or otherwise used, plus the quantity released or disposed of as a by-product, meet or exceed 10 tonnes?
The facility IS required to submit a report for the Part 1A substance.
YES
NO
The facility IS NOT required to submit a report for the Part 1A substance.
Was the Part 1B substance manufactured, processed or otherwise used at a concentration and quantity equal to or greater than the levels listed in Box C?
The facility IS required to submit a report for the Part 1B substance.
YES
NO
The facility IS NOT required to submit a report for the Part 1B substance.
Was an individual Part 2 substance (see Box D) released on site, disposed of or transferred off site for recycling from a wood-preservation process using creosote?
The facility IS required to submit a report for Part 2 substances released, disposed of or transferred for recycling from wood preservation using creosote.
YES
NO
The facility IS NOT required to submit a report for Part 2 substances released, disposed of or transferred for recycling from wood preservation using creosote.
Was an individual Part 2 substance (see Box D) incidentally manufactured such that the sum of all of the Part 2 substances released on site, disposed of or transferred off site for recycling was equal to or greater than 50 kg?
The facility IS required to submit a report for Part 2 substances released, disposed of or transferred for recycling as the result of incidental manufacture.
YES
NO
The facility IS NOT required to submit a report for any Part 2 substances.
Was the facility engaged in one or more of the activities listed in Box E?
The facility IS required to submit a report for ALL Part 3 substances.
YES
NO
The facility IS NOT required to submit a report for any Part 3 substances.
Go to the flowchart in Figure 3 to determine if your facility is required to report for Part 4 or Part 5 substances.
Box A
A facility is exempt from reporting a substance listed in Parts 1A through 3 if the only source or use of that NPRI substance at the facility is from one or more of the activities listed below:
• educating or training students, such as at universities, colleges and schools;
• research or testing;
• maintaining and repairing transportation vehicles, such as automobiles, trucks, locomotives, ships or aircraft, except painting and stripping of vehicles and their components, or the rebuilding or remanufacturing of vehicle components;
• distribution, storage or retail sale of fuels, except as part of the terminal operations;
• wholesale or retail sale of articles or products if the substance is not released to the environment during normal use at the facility;
• retail sale of the substance;
• growing, harvesting or managing renewable natural resources, such as in fisheries, forestry or agriculture, but not the processing or other use of renewable natural resources;
• mining, but not the further processing or other use of mined materials; and
• the practice of dentistry.
Box B
Was the facility used for any of the following activities to which the 20 000-hour employee threshold does not apply?
• non-hazardous solid waste incineration of 26 tonnes or more of waste per year, including small combustion units, conical burners and beehive burners;
• biomedical or hospital waste incineration of 26 tonnes or more of waste per year;
• hazardous waste incineration;
• sewage sludge incineration;
• wood preservation;
• terminal operations; and
• discharge of treated or untreated wastewater from a wastewater collection system with an annual average discharge of 10 000 m³/day or more, into surface waters.
Box C
Part 1B substances—Specific Metals and Their Compounds, and Organometals at Reduced Thresholds:
Substance | Mass Threshold | Concentration Threshold
Mercury (and its compounds) | 5 kg | n/a
Cadmium (and its compounds) | 5 kg | 0.1 %
Arsenic (and its compounds) | 50 kg | 0.1 %
Hexavalent chromium compounds | 50 kg | 0.1 %
Lead (and its compounds) | 50 kg | 0.1 %
Tetraethyl lead (CAS No. 78-00-2) | 50 kg | 0.1 %
Box D
Part 2 Substances – 17 Individual PAHs:
• Benzo(a)anthracene (CAS No. 56-55-3)
• Benzo(a)phenanthrene (218-01-9)
• Benzo(a)pyrene (50-32-8)
• Benzo(b)fluoranthene (205-99-2)
• Benzo(e)pyrene (192-97-2)
• Benzo(g,h,i)perylene (191-24-2)
• Benzo(j)fluoranthene (205-82-3)
• Benzo(k)fluoranthene (207-08-9)
• Dibenz(a,j)acridine (224-42-0)
• Dibenzo(a,h)anthracene (53-70-3)
• Dibenzo(a,i)pyrene (189-55-9)
• 7H-Dibenzo(c,g)carbazole (194-59-2)
• Fluoranthene (206-44-0)
• Indeno(1,2,3-c,d)pyrene (193-39-5)
• Perylene (198-55-0)
• Phenanthrene (85-01-8)
• Pyrene (129-00-0)
Box E
Was the facility engaged in one or more of the following activities?
• non-hazardous solid waste incineration of 26 tonnes or more of waste per year, including small combustion units, conical burners and beehive burners;
• biomedical or hospital waste incineration of 26 tonnes or more of waste per year;
• hazardous waste incineration;
• sewage sludge incineration;
• base metals smelting (copper, lead, nickel and zinc);
• smelting of secondary aluminum;
• smelting of secondary lead;
• manufacturing of iron using a sintering process;
• operation of electric arc furnaces in steel foundries;
• operation of electric arc furnaces in steel manufacturing;
• production of magnesium;
• manufacturing of portland cement;
• production of chlorinated organic solvents or chlorinated monomers;
• combustion of fossil fuel in a boiler unit with a nameplate capacity of 25 megawatts or greater of electricity, for the purpose of producing steam for the production of electricity;
• combustion of hog fuel originating from logs that were transported or stored in salt water in the pulp and paper sector;
• combustion of fuel in kraft liquor boilers used in the pulp and paper sector; or
• wood preservation using pentachlorophenol.

Figure 3:

CRITERIA FOR REPORTING PART 4 SUBSTANCES (CACs) AND PART 5 (SPECIATED VOCs) TO NPRI FOR 2004


Was the facility exclusively used for oil and gas exploration or the drilling of oil or gas wells?
YES
Your facility IS NOT required to submit a report to the NPRI.
NO
Was the facility exclusively used for an activity listed in Box 1?
YES
NO
Was the facility a pipeline installation? [1]
YES
NO
Did employees work 20 000 hours or more during the 2004 calendar year?
YES
Was the facility used for one or more of the activities listed in Box 2?
YES
Did the facility operate any stationary combustion equipment[2]?
YES
NO
CASE 1 – All releases to air from stationary sources
When determining whether the release threshold was met (next box):
• for all activities at the facility, consider all releases to air,
however
• for activities listed in Box 1 that the facility was engaged in, only consider releases to air from stationary combustion equipment[2].
CASE 2 – Stationary combustion equipment
• When determining whether the release threshold was met, consider releases to air from only stationary combustion equipment[2] at the facility.
Possible exclusion for CASE 2 facilities:
Did the facility meet all of the following requirements?
a) the CAC releases to air occurred only from stationary external combustion equipment; and
b) the cumulative nameplate capacity of that equipment was < 10 million BTU/hour; and
c) the only type of fuel combusted in that equipment was commercial grade natural gas, liquefied petroleum gas (the most common liquefied petroleum gas is propane), Number 1 or 2 fuel oil or any combination thereof.
NO
YES
Were one or more CAC substances released to air in a quantity greater than or equal to the threshold(s) listed below?
Nitrogen oxides, NO, (expressed as NO2) 20 tonnes
Sulphur dioxide, SO2 20 tonnes
Carbon monoxide, CO 20 tonnes
Volatile organic compounds, VOCs 10 tonnes
Total particulate matter, TPM[3] 20 tonnes
Particulate matter ≤ 2.5 microns, PM2.5 [3] 0.3 tonnes
Particulate matter ≤ 10 microns, PM10 [3] 0.5 tonnes
YES
NO
A report is required for each CAC substance that met its respective threshold. If the 10-tonne VOCs threshold was met, you may be required to report Part 5 substances. Refer to 3.9 Reporting Criteria for Part 5 Substances – Speciated VOCs.
The facility IS NOT required to submit a report to the NPRI for any CAC.

Box 1

Activities Where Only CAC Emissions from Stationary Combustion Equipment Are Considered:

- education or training of students, such as at universities, colleges and schools;
- research or testing;
- maintaining and repairing of transportation vehicles, such as automobiles, trucks, locomotives, ships or aircraft, *except* painting and stripping of vehicles or their components, or the rebuilding or remanufacturing of vehicle components;
- distribution, storage or retail sale of fuels, *except* as part of the terminal operations;
- wholesale or retail sale of articles or products, if the substance is not released to the environment during normal use at the facility;
- retail sale of the substance;
- growing, harvesting or managing renewable natural resources, such as fisheries, forestry or agriculture, *but not* the processing or other use of renewable natural resources;
- mining, *but not* the further processing or other use of mined materials;
- the practice of dentistry.

Box 2

- non-hazardous solid waste incineration of 26 tonnes or more of waste per year, including small combustion units, conical burners and beehive burners;
- biomedical or hospital waste incineration of 26 tonnes or more of waste per year;
- hazardous waste incineration;
- sewage sludge incineration;
- wood preservation;
- terminal operations;
- discharge of treated or untreated wastewater from a wastewater collection system with an annual average, discharge of 10 000 m^3/day or more, into surface waters.

[1] See 3.2 Facility Criteria for explanation of pipeline installation.
[2] Stationary combustion equipment includes both external and internal combustion equipment.
[3] Do not consider releases from road dust.

3.2 Facility Criteria

In 2002, there were two different facility types – "contiguous facility" and "pipeline installation." With the removal of the oil and gas sector exemption from the NPRI for the 2003 reporting year, a third facility type, "offshore installation," was added to the facility definition to level the playing field between offshore and onshore oil and gas operations. As such, the term "facility," as defined in the *Canada Gazette* notice, now refers to "contiguous facilities," "offshore installations" and "pipeline installations." Definitions are provided below.

Contiguous Facility

A *contiguous facility* means all buildings, equipment, structures and stationary items that are located on a single site or on contiguous or adjacent sites and that are owned or operated by the same person and that function as a single integrated site, and also includes wastewater collection systems that discharge treated or untreated wastewater into surface waters.

Pipeline Installation

A *pipeline installation* is defined as a collection of equipment situated at a single site, used in the operation of a natural gas transmission or distribution pipeline. Pipeline installations are subject only to the reporting criteria for CACs (Part 4 substances) and speciated VOCs (Part 5 substances) and not other NPRI substances.

Pipeline installations are spaced approximately 80–160 kilometres (50–100 miles) apart along a pipeline from a gas supply area to the market area. This definition includes pipeline compressor and storage stations along pipelines used to transport both raw and processed natural gas.

Offshore Installation

An offshore installation is defined as an offshore drilling unit, production platform or ship, or subsea installation attached to or anchored to the continental shelf of Canada in connection with the exploration of oil or gas.

3.2.1 Facilities Exempt from Reporting to the NPRI

A facility exclusively used for oil and gas exploration or the drilling of oil and gas wells is exempt from reporting to the NPRI. This is the only type of oil and gas facility exempt from reporting to the NPRI.

3.2.2 Activities Exempt from Reporting Parts 1A, 1B, 2 and 3 Substances

A facility is exempt from reporting Parts 1A through 3 substances to the NPRI if the only source or use of that NPRI substance at the facility was from one or more of the activities listed in Table 3. In cases where a facility met the reporting criteria for a substance based on sources other than those listed in Table 3, it should not include the quantity of that same substance from any exempt activities (listed in Table 3) when reporting releases, disposals or transfers to the NPRI.

Table 3:

ACTIVITIES NOT CONSIDERED WHEN REPORTING PARTS 1A, 1B, 2 AND 3 SUBSTANCES TO NPRI

- educating or training students, such as at universities, colleges and schools;
- research or testing;
- maintaining and repairing transportation vehicles, such as automobiles, trucks, locomotives, ships or aircraft, *except* painting and stripping of vehicles or their components, or rebuilding or remanufacturing of vehicle components;
- distribution, storage or retail sale of fuels, *except* as part of terminal operations[1];
- wholesale or retail sale of articles or products which contain NPRI substances, if the substance is not released to the environment during normal use at the facility;
- retail sale of NPRI substances;
- growing, harvesting or managing renewable natural resources, such as fisheries, forestry or agriculture, *but not* the processing or other use of renewable natural resources;
- mining activities related to the actual removal of ore, rock or overburden, up to and including primary crushing, but not the further processing or other use of mined materials. Further processing includes, but is not limited to, secondary crushing, screening, and conveying;
- the practice of dentistry.

[1] See section 3.3.2 and the Glossary for explanation of "terminal operations."

Note: Activities in Table 3 are not exempt from reporting for Part 4 or Part 5 substances.

The exemption for the maintenance and repair of transportation vehicles was modified in 2002 to make a distinction between activities associated with maintaining/repairing and activities related to painting/rebuilding of transportation vehicles, vessels and aircraft. Substances used for activities involving routine, scheduled and preventative maintenance continue to be exempt (e.g., repair, cleaning, replacement of lubricants/fluids). However, substances used in the painting or stripping of vehicles or vehicle components are now subject to reporting. Additionally, there is no exemption for activities that involve the removal, breakdown and total reconstruction of vehicle components (e.g., engines, landing gear, traction motors) using recovered or new parts, such that the rebuilt component is reinstalled or sold as an "as new" replacement.

The distribution, storage or sale of fuels exemption was also revised in 2002 to exclude terminal operations. Terminal operations are important sources of VOCs. To capture reporting from these sources, the 20 000-hour employee threshold was removed, since these facilities often employ few workers.

3.2.3 Exclusions (for All Substances)

A facility should not include the quantity of a substance from any sources listed in Table 4 when calculating the reporting thresholds or when reporting releases, disposals or transfers for recycling to the NPRI.

Table 4:

SOURCES NOT CONSIDERED WHEN REPORTING TO NPRI

- **articles that are processed or otherwise used**[1]
- **materials used as structural components of the facility** – The exclusion of structural components of the facility from the reporting threshold is limited to buildings and other fixed structures but does not include process equipment.
- **materials used in routine janitorial or facility grounds maintenance** – This includes NPRI substances contained in fertilizers and pesticides used for grounds maintenance and cleaning agents, floor waxes, etc., used for maintaining facility cleanliness. The maintenance of processing equipment is not considered "routine janitorial" or "facility grounds" maintenance. For example, if manufacturing or processing equipment is cleaned with a solvent, the amount of the NPRI substance(s) contained in the solvent should be included in the threshold calculation.
- **materials used for personal use by employees or other persons**
- **materials used for the purpose of maintaining motor vehicles operated by the facility**
- **intake water or intake air** – This refers to water used for process cooling or air used either as compressed air or for combustion.
- **road dust**

[1] See 3.4.5 "Definitions" for explanation of "article."

In addition to the sources listed in Table 4, vehicle emissions should not be considered when calculating the substance threshold or reporting the amount released. For the purpose of NPRI reporting, vehicle refers to any mobile equipment that is capable of self-propulsion. Therefore, vehicle emissions exempt from NPRI reporting include emissions from any mobile, self-propelled equipment. This includes emissions from fleet vehicles and earth moving equipment including, but not limited to, loaders, dump trucks, forklifts, excavators and bulldozers.

3.3 20 000-hour Employee Threshold

Before determining whether the facility met the substance-specific threshold for any substances listed in the NPRI and what sources need to be reported, the facility must determine if it met the employee criteria. This threshold depends on the number of hours worked by all employees at the facility during the calendar year. To determine if your facility met the 20 000-hour employee threshold, include all hours worked by:

- persons employed at the facility, including students, part-time and term employees,
- owner(s) who performed work on site at the facility, and
- persons who performed work on site at the facility on a routine basis related to the normal operation of the facility, for the period of time the person performed that work, such as contractors.

The total number of hours worked includes paid vacation and sick leave.

The employee threshold must be met by most companies before they need to consider reporting for Parts 1A through 3 substances. The relevance of the employee threshold will become self-evident after reviewing the NPRI reporting criteria provided in sections 3.4 to 3.9.

3.3.1 Activities to Which the 20 000-hour Employee Threshold Does Not Apply

If your facility was used mainly or exclusively for one or more of the activities listed in Table 5, you must submit a report for any NPRI substance that met its respective reporting criteria, regardless of the number of hours worked by employees. The employee threshold does not apply because facilities used for these activities are known to release significant quantities of NPRI pollutants to the environment, but often were not required to report to the NPRI since they did not meet the 20 000-hour employee threshold.

Complete descriptions of these activities are provided below. In addition to the activities in Table 5, regardless of employee hours, facilities that operate stationary combustion equipment must report for Parts 4 and 5 substances provided their release-thresholds are met.

Table 5:

ACTIVITIES TO WHICH THE 20 000-HOUR EMPLOYEE THRESHOLD DOES NOT APPLY

Waste Incineration Activities
a) non-hazardous solid waste incineration of 26 tonnes or more of waste per year, including small combustion units, conical burners and beehive burners
b) biomedical or hospital waste incineration of 26 tonnes or more of waste per year
c) hazardous waste incineration
d) sewage sludge incineration
Wood Preservation Activities
e) wood preservation (using heat or pressure treatment, or both)
Terminal Operation Activities
f) terminal operations related to fuels
Wastewater Systems
g) wastewater collection systems discharging 10 000 m^3 or more per day, into surface waters

Waste Incineration Activities

The first four activities listed in Table 5 are forms of waste incineration. *Waste incineration*, for the purposes of the NPRI, only includes incineration that takes place in a waste incinerator. Waste incineration does not include open burning of wastes.

A *waste incinerator* is a device, mechanism or structure constructed primarily to thermally treat (e.g., combust or pyrolyze) a waste for the purpose of reducing its volume, or destroying hazardous chemicals or pathogens present in the waste. This includes facilities where waste heat is recovered as a by-product from the exhaust gases from an incinerator (e.g., energy-from-waste incinerators), conical burners and beehive burners. This does not include industrial processes where fuel derived from waste is fired as an energy source, such as industrial boilers. For example, if bark, wood chips or other wood waste is used as fuel to fire a boiler, these activities are not considered energy-from-waste incinerators.

a) **Non-hazardous solid waste incineration of 26 tonnes or more of waste per year, including small combustion units, conical burners and beehive burners**
Non-hazardous solid waste means any solid waste, regardless of origin, that might normally be disposed of in a non-secure manner, such as at a sanitary landfill site, if not incinerated. It includes clean wood waste, i.e., waste from woodworking or forest product operations, including bark, where the wood waste has not been treated with preservative chemicals (e.g., pentachlorophenol) or decorative coatings. Non-hazardous solid waste incineration includes incineration of residential and other municipal wastes in conical burners, and clean wood waste in beehive burners.

A facility used for the incineration of 26 tonnes or more of non-hazardous solid waste per year is required to report to the NPRI if it met the substance criteria, regardless of the number of hours worked by employees.

b) **Biomedical or hospital waste incineration of 26 tonnes or more of waste per year**
Biomedical waste is fully defined in Appendix 3. *Biomedical or hospital waste* refers to waste that is generated by:

- human or animal health-care facilities,
- medical or veterinary research and testing establishments,
- health-care teaching establishments,
- clinical testing or research laboratories, and
- facilities involved in the production or testing of vaccines.

Biomedical or hospital waste includes human anatomical waste and animal waste. It also includes microbiology laboratory waste, human blood and body fluid waste and waste sharps that have not been disinfected or decontaminated. It does not include waste from animal husbandry, or waste that is controlled in accordance with the *Health of Animals Act* (Canada).

Wastes that are household in origin or that are generated in the food production, general building maintenance and office administration activities of those facilities to which this definition applies are not considered to be biomedical or hospital waste but rather to be non-hazardous solid waste.

A facility used for biomedical or hospital waste incineration of 26 tonnes or more of waste per year is required to report to NPRI if it met the substance criteria, regardless of the number of hours worked by employees.

c) **Hazardous waste incineration**
Hazardous waste is fully defined in Appendix 4. *Hazardous waste* includes those wastes that are potentially hazardous to human health and/or the environment because of their nature and quantity, and that require special handling techniques. Hazardous waste incinerators must be licensed or authorized by the responsible jurisdiction. Hazardous waste incinerated in a mobile incinerator temporarily located at your facility must be included as part of this activity.

A facility used for the incineration of hazardous waste is required to report to NPRI if it met the substance criteria, regardless of the number of hours worked by employees or the quantities incinerated.

d) **Sewage sludge incineration**
Sludge means a semi-liquid mass removed from a liquid flow of wastes. Sewage sludge means sludge from a facility treating wastewater from a sewer system. The drying of sludge to reduce water content is part of the incineration stage.

A facility used for the incineration of sewage sludge is required to report to NPRI if it met the substance criteria, regardless of the number of hours worked by employees or the quantities incinerated.

Wood Preservation Activities

e) **Wood preservation (using heat or pressure treatment or both)**
Wood preservation means the use of a preservative for the preservation of wood by means of heat or pressure treatment, or both, and includes the manufacture, blending or reformulation of wood preservatives for that purpose.

A facility used for wood preservation is required to report to the NPRI for Part 1A and 1B substances if it met the substance criteria, regardless of the number of hours worked by employees.

Wood preservation using creosote

A facility used for wood preservation must report for any of the 17 individual PAHs released on site, disposed of or transferred off site for recycling from a wood-preservation process using creosote, regardless of the number of hours worked by employees.

Wood Preservation using pentachlorophenol

A facility used for wood preservation using pentachlorophenol must report for dioxins/furans and HCB, regardless of the number of hours worked by employees or the quantities of dioxins/furans and HCB released on site, disposed of or transferred off site for recycling.

For more detailed information regarding wood preservation and NPRI reporting, operators of wood-preservation facilities can consult the supplementary document *Guidance for Wood Preservation Facilities Reporting to the National Pollutant Release Inventory* (Environment Canada, 2003). This technical guide is available on the NPRI reporting software CD and the NPRI Web site <www.ec.gc.ca/npri/>.

Terminal Operation Activities

f) Terminal operations related to fuel

For the purposes of reporting, *terminal operations* refer to either i) the use of storage tanks and associated equipment at a site used to store or transfer crude oil, artificial crude or intermediates of fuel products into or out of a pipeline, or ii) the operating activities of a primary distribution installation normally equipped with floating roof tanks that receives gasoline by pipeline, railcar, marine vessel or directly from a refinery. The definition of terminal operations does not include bulk plants or service stations.

A facility used for terminal operations is required to report to NPRI if it met any substance criteria, regardless of the number of hours worked by employees.

Wastewater Systems

g) Wastewater collection systems discharging 10 000 m^3 or more per day into surface waters

A *wastewater facility* is defined for NPRI as a wastewater collection system that discharges treated or untreated wastewater into surface waters with an annual average discharge of 10 000 cubic metres or more per day. Therefore, a wastewater system for NPRI reporting purposes includes both the *treatment* and *collection* components.

A *wastewater collection system* is the system of sewers and/or ditches that convey sanitary or combined sewage for a community. The volume of sewage released to surface waters from the collection system must be included in the calculation of annual average discharge per day from the wastewater facility. Potential effluent volumes of importance to include in the calculation of the annual average discharge per day from the collection system include:

- direct discharge of sewage from a main outfall where no treatment exists,
- sanitary sewer system overflows,
- combined sewer system overflows,
- pumping station overflows, and
- bypass flows (for repair and maintenance activities or for emergency response activities).

A collection system includes adjacent service areas or adjoining sewage sheds that function as a single integrated system for a community. Discharges to the environment from all components of the system must be considered when determining whether your facility met the flow threshold and substance reporting criteria. Where no treatment facilities exist, the wastewater facility consists of the entire collection system, and may require NPRI reporting if it met the basic reporting requirements.

Communities whose collection systems discharge into another community's collection system do not have to report to NPRI. Reporting may be required by the receiving community if it met the basic reporting requirements.

A *wastewater treatment* system means a plant or process location that accepts collection system flows of a community for the purposes of removing substances from the wastewater. The volume of both treated and untreated sewage released from the wastewater treatment system must be included in the calculation of annual average discharge per day from the wastewater facility. Potential effluent volumes of importance to include in the calculation of the annual average discharge per day from the wastewater treatment system include:

- process flow,
- sludge treatment discharges (biosolids/sludges),
- backwash and filter discharges released to surface waters (i.e., not including process waste recycled back into the wastewater treatment system),
- tank drainage released to surface waters (i.e., not including process waste recycled back into the wastewater treatment system), and
- bypass flows released to surface waters (untreated or partially treated) for repair and maintenance activities, or from hydraulic overloads.

A wastewater collection system with an annual average discharge of greater than or equal to 10 000 m^3/day of untreated or treated water to surface water is required to report to NPRI if it met any substance criteria, regardless of the number of hours worked by employees.

For more detailed information regarding the wastewater sector and NPRI reporting, operators of wastewater collection or treatment facilities can consult the supplementary document *National Pollutant Release Inventory Guidance Manual for the Wastewater Sector* (Environment Canada, 2004b).

3.4 Reporting Criteria for Part 1A Substances

3.4.1 Overview

Part 1A lists substances of concern, most of which have been on the NPRI since its inception. These compounds are commonly referred to as the "core" substances and comprise the majority of the NPRI substance list.

3.4.2 Substances

The Part 1A substance list includes 231 substances with a manufacture, process or other use threshold. These substances, along with all other NPRI substances, are listed in alphabetical order in Appendix 1 and by CAS number in Appendix 2. Substances that do not have a unique CAS number are noted with an asterisk (*).

Substance Qualifiers

Some groups of substances and individual substances on the Part 1A list are qualified in terms of their specific physical or chemical form, state or particle size. These qualifiers will determine whether your facility will be required to report for a given substance:

- **fume or dust**
  This qualifier for aluminum refers to solids with particle diameters of 0.001 to 1 micron for fumes and 1 to 100 microns for dust particles.

- **fibrous forms**
  This qualifier, applied to aluminum oxide, includes the form of aluminum oxide found in brake linings but excludes the more common granular, powdered or fumed forms of alumina.

- **salts**
  Weak acids and bases are listed with this qualifier. Although the CAS number that appears on the NPRI list is specific to the acid or base, all salts of these listed substances must be reported as an equivalent weight of the acid or base.

- **compounds**
  Nine NPRI Part 1A substances have this qualifier: Antimony, chromium, cobalt, copper, manganese, nickel, selenium, silver and zinc. The pure metal and any substance, alloy or mixture **must be reported as the equivalent weight of the metal itself**. No CAS number is provided in NPRI for these substances as a CAS number applies for each substance, alloy or mixture.

For example, a galvanizing facility that uses zinc chloride ($ZnCl_2$, molecular weight = 136.3 g/mol) should only consider the mass contribution of Zn (atomic weight = 65.4 g/mol) when determining whether it met the reporting threshold for zinc and calculating its releases, disposals and transfers. Based on the atomic to molecular weight ratio, for every tonne of $ZnCl_2$ there are about 0.5 tonnes of Zn. Therefore, if $ZnCl_2$ was the only source of Zn at this facility, Zn reporting would be triggered if approximately 20 tonnes of $ZnCl_2$ were used.

Note that chromium appears on the Part 1A list with the following qualifier: "and its compounds, except for hexavalent chromium compounds." This is because hexavalent chromium compounds are reported separately (see 3.5 "Reporting Criteria for Part 1B Substances"). When calculating the mass threshold for chromium and its compounds, exclude the contribution from hexavalent chromium compounds in the calculation. Separate reports must be submitted for the Part 1A listing, "chromium (and its compounds)" and the Part 1B listing, "hexavalent chromium compounds."

- **(except when in an alloy) and its compounds**
  This qualifier applies only to vanadium. The pure element and any substance or mixture must be reported as the equivalent weight of the element. No CAS number is provided for these substances. Do not include vanadium contained in an alloy. An alloy includes metal products containing two or more elements as a solid solution, intermetallic compounds and/or mixtures of metallic phases.

  This change to the qualifier for vanadium was made in 2001 to capture all forms of vanadium and its compounds released from the combustion of fuel.

- **friable form**
  Asbestos is the general name for several fibrous minerals and products. Only asbestos that is brittle and readily crumbled should be reported.

- **mixed isomers**
  This qualifier is used for mixtures of isomers which have the same chemical formula but different chemical structures. The substances with this qualifier are dinitrotoluene and toluenediisocyanate. Substances with this qualifier are usually found as mixtures. The total quantity of all isomers must be used in calculating the 10-tonne threshold quantity. Do not apply the 10-tonne reporting threshold to each individual isomer unless the pure isomer alone is manufactured, processed, otherwise used or is an NPRI by-product.

- **all isomers**
  This qualifier is applied to cresol, xylene and three hydrochlorofluorocarbons (HCFC-122, HCFC-123 and HCFC-124). Each of these substances should be reported as an aggregate of the individual isomers that have the same chemical formula but different chemical structures. The total quantity of all isomers must be used in calculating the 10-tonne threshold. Refer to Appendices 1 and 2.

- **ionic**
  This qualifier, applied to cyanides, includes the salts of hydrogen cyanide but excludes organocyanides, nitriles and organometallic cyanide compounds such as ferrocyanide. In the mining industry, ionic cyanide is equivalent to "weak acid dissociable" cyanide.

- **total**
  For aqueous solutions of ammonia, this means both NH_3 and NH_4^+ expressed as ammonia.

  For phosphorus, this does not include "phosphorus (yellow or white)." The "phosphorus (total)" listing was added to the NPRI in 2003. Given the ubiquitous nature of phosphorus, certain forms of phosphorus are exempt from total phosphorus reporting. Further information, including the rational for exempt and reportable forms, is provided in the *Phosphorus Guidance* document available through the *NPRI Toolbox*.

- **yellow or white**
  This qualifier is the general description for the common allotropes of elemental phosphorus.

- **in solution at a pH of 6.0 or greater**
  This distinguishes nitrate ion in neutral or basic solution from nitric acid (pH of less than 6.0). If nitric acid is neutralized to a pH of 6.0 or greater, you must submit a report for both "nitric acid" and for "nitrate ion in solution." Your release, disposal or transfer for recycling of nitric acid would be "zero" and your release, disposal or transfer for recycling of nitrate ion would reflect the quantity of neutralized nitric acid reported as nitrate ion in solution at a pH of 6.0 or greater.

In most cases, consider only the substances and the CAS numbers listed. For example, "styrene" is listed with its corresponding CAS number "100-42-5." The chemical description that corresponds to this CAS number does not include "polystyrene." There are no polymers on the NPRI list, only monomers.

Material Safety Data Sheets (MSDSs) are an important source of information on the composition of purchased products. Suppliers of hazardous materials are required, as part of the Workplace Hazardous Material Information System (WHMIS), to supply MSDSs on request.

3.4.3 Units

The reporting unit for NPRI Part 1A substances is tonnes.

3.4.4 Reporting Criteria

In general, any person who owns or operates a facility must submit a report to the NPRI for a Part 1A substance *only* if all of the following criteria are met:

- employees worked a total of 20 000 hours or more or the facility was used for an activity to which the 20 000-hour employee threshold does not apply (see Table 5),

and

- the facility manufactured, processed or otherwise used 10 tonnes (10 000 kg) or more of an NPRI Part 1A substance in the 2004 calendar year,

and

- the NPRI Part 1A substance was manufactured, processed or otherwise used at a concentration greater than or equal to 1% by weight, with the exception of NPRI substances considered to be by-products. The total weight of by-products at any concentration must also be included in the calculation of the 10-tonne threshold for each NPRI Part 1A substance.

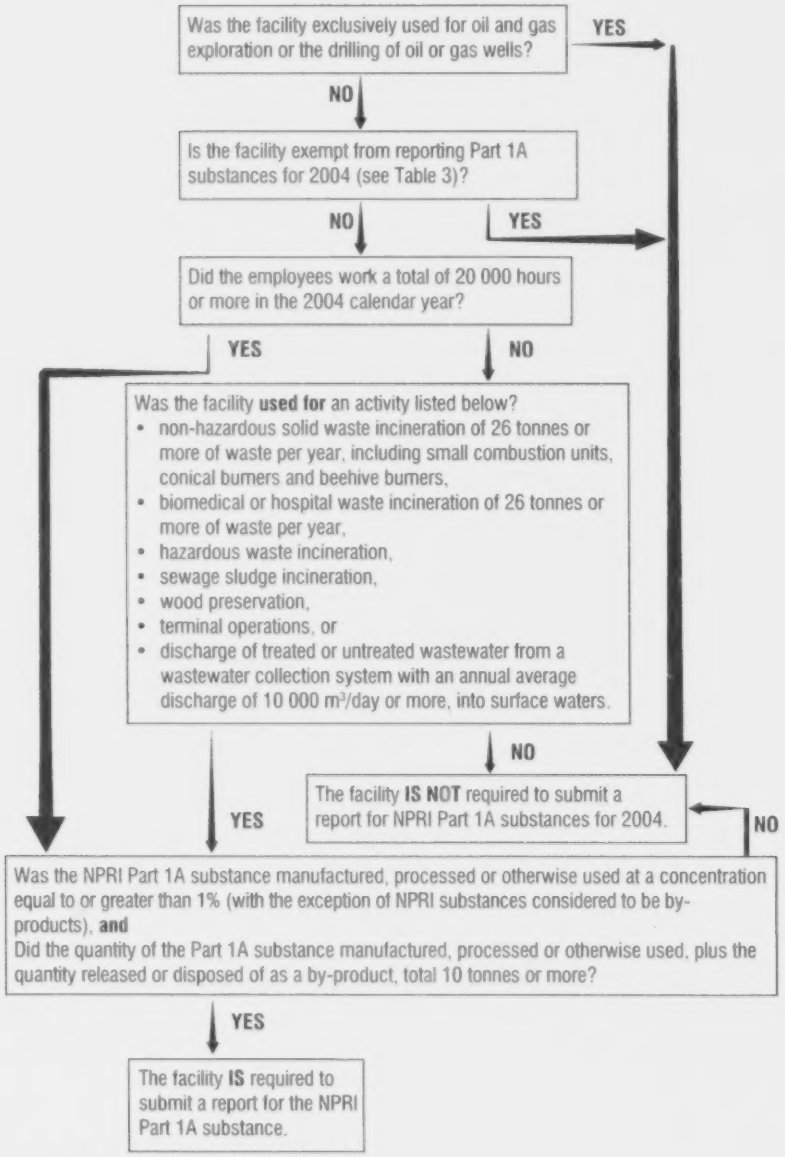
Figure 4 illustrates the steps for determining if your facility is required to submit a report for a given NPRI Part 1A substance. A facility must meet **all the reporting criteria** before it is required to report releases, disposals or transfers of the Part 1A substance.

Once you have determined that your facility is required to submit a report for an NPRI Part 1A substance, all releases, disposals and transfers for recycling of that substance are reportable, regardless of their concentration or quantity (including "zero" releases, disposals and transfers for recycling).

For guidance on estimating releases, disposals and transfers for recycling, refer to the *NPRI Toolbox*.

Figure 4:

REPORTING CRITERIA FOR PART 1A SUBSTANCES


Was the facility exclusively used for oil and gas exploration or the drilling of oil or gas wells?
YES
NO
Is the facility exempt from reporting Part 1A substances for 2004 (see Table 3)?
NO
YES
Did the employees work a total of 20 000 hours or more in the 2004 calendar year?
YES
NO
Was the facility used for an activity listed below?
• non-hazardous solid waste incineration of 26 tonnes or more of waste per year, including small combustion units, conical burners and beehive burners,
• biomedical or hospital waste incineration of 26 tonnes or more of waste per year,
• hazardous waste incineration,
• sewage sludge incineration,
• wood preservation,
• terminal operations, or
• discharge of treated or untreated wastewater from a wastewater collection system with an annual average discharge of 10 000 m³/day or more, into surface waters.
NO
YES
The facility IS NOT required to submit a report for NPRI Part 1A substances for 2004.
NO
Was the NPRI Part 1A substance manufactured, processed or otherwise used at a concentration equal to or greater than 1% (with the exception of NPRI substances considered to be by-products), and
Did the quantity of the Part 1A substance manufactured, processed or otherwise used, plus the quantity released or disposed of as a by-product, total 10 tonnes or more?
YES
The facility IS required to submit a report for the NPRI Part 1A substance.

3.4.5 Definitions

The terms *manufacture*, *process* and *other use* are defined below. An NPRI Part 1A substance at a concentration equal to or greater than 1% or an NPRI Part 1A by-product at any concentration are included in the calculation of the 10-tonne reporting threshold if they were manufactured, processed or otherwise used. An NPRI report does not have to be submitted for a substance that was never manufactured, processed or otherwise used at the facility during the reporting year.

Manufacture

The term *manufacture* means to produce, prepare or compound an NPRI substance. It also includes the coincidental production of an NPRI substance as a "by-product" resulting from the manufacture, processing or other use of other substances.

The production of chlorine dioxide by a chemical plant is an example of manufacturing. The production of hydrochloric acid during the manufacture of chlorofluorocarbons is an example of coincidental production.

Process

The term *process* means the preparation of an NPRI substance, after its manufacture, for distribution in commerce. Processing includes the preparation of a substance with or without changes in physical state or chemical form. The term also applies to the processing of a mixture or formulation that contains an NPRI substance as one component, as well as the processing of "articles" (see the definition of "article," below).

The use of chlorine (an NPRI substance) to manufacture hypochloric acid (not an NPRI substance) is an example of processing of chlorine. The use of toluene and xylene to blend paint solvent mixtures is an example of processing without changes in chemical form.

Other Use

The terms *other use* and *otherwise used* encompass any use or disposal of an NPRI substance at a facility that does not fall under the definitions of "manufacture" or "process." This includes the use of the substance as a chemical processing aid, manufacturing aid or some other ancillary use. The use of trichloroethylene in the maintenance of manufacturing and process equipment is considered an "other use." "Other use" does not include substances used for routine janitorial or facility grounds maintenance (see section 3.23 "Exclusions" and Table 4).

By-products

A *by-product* is an NPRI substance that is incidentally manufactured, processed or otherwise used at the facility at any concentration by weight, and that is released on site to the environment or disposed of.

By-products are included in the calculation of the 10-tonne reporting threshold for Part 1A substances to capture large-volume, low-concentration releases and disposals. Some examples of affected sectors include, but are not limited to, power generation, aluminum smelting, and pulp and paper production.

Normally, only NPRI Part 1A substances in concentrations equal to or greater than 1% are included in the threshold calculations. The 1% concentration limit is consistent with the reporting requirements under the WHMIS. Minor constituents (with some exceptions) are not included on MSDSs. *However, NPRI Part 1A by-products at any concentration by weight must be included in the calculation of the 10-tonne reporting threshold.*

The NPRI requirements apply to any person who possesses or who may reasonably be expected to have access to the types of information requested. This reasonable expectation limits the reporting liability of facilities that cannot easily determine minor amounts of NPRI substances in their feedstock or process.

To determine if an NPRI Part 1A substance is a by-product, the following criteria should be considered:

- The NPRI Part 1A substance is not relevant to the manufacture, processing or other use of substances at the facility. It may be the product of an unwanted side-reaction or an impurity in a feedstock material.
- NPRI Part 1A substances that meet the above criteria are only considered by-products if they are released to the environment or disposed of. Substances that are recycled or that remain in the final product are excluded from the by-product definition.

The following examples illustrate application of the by-product definition:

Example 1
Hydrogen fluoride is incidentally manufactured and released during aluminum smelting. For some large facilities, more than 10 tonnes may be released to the atmosphere at concentrations of less than 1%. Since hydrogen fluoride is an NPRI Part 1A substance, the weight of the hydrogen fluoride by-product must be used in the calculation of the 10-tonne reporting threshold.

Example 2
Manganese and nickel are incidentally present in coal. During combustion, a portion of these metals is concentrated in the ash, which is disposed of, and a portion of the metals is released in stack emissions. The weight of the heavy metal by-products must be included in the calculation of the 10-tonne reporting threshold, regardless of the initial concentrations of the metals in the coal.

Example 3
An NPRI Part 1A substance is present in trace amounts in a product that is being packaged for retail sale. The quantity of this substance released through spillage or through fugitive air emissions cannot be determined because the formulation of the product is proprietary or the substance concentration is not listed on the MSDS and more detailed information cannot be obtained from the supplier or manufacturer. Although this NPRI Part 1A substance is considered a by-product, it is not included in the calculation of the 10-tonne reporting threshold because it is an unreasonable expectation that the facility could obtain information on the substance identity, concentration or quantity.

Article

An *article* is defined as a manufactured item that does not release an NPRI substance under normal conditions of processing or use. When articles are processed and there are no releases, or the releases are recycled 100% with due care, the NPRI substances in that article need not be included in the threshold calculation. Exercising "due care" in ensuring 100% recycling means that the facility generated less than 1 kg of the NPRI Part 1A substance as waste during the calendar year. Special reporting guidance has been developed for welding rods and welded materials and can be accessed through the *NPRI Toolbox*.

Example
A battery meets the definition of an article if used under normal conditions at a facility. A metal reclamation facility accepts spent lead-acid batteries for recycling. The batteries are broken into pieces in a hammermill and their parts (sulphuric acid, lead and plastic) are subsequently reclaimed. In this context, the batteries lose their article status since they are broken apart during the recycling process. Consequently, the sulphuric acid in the batteries must be included in the facility's calculation of the 10-tonne reporting threshold for this substance.

3.4.6 Calculating the 10-tonne Reporting Threshold

The 10-tonne reporting threshold is based on the quantity of an NPRI Part 1A substance manufactured, processed or otherwise used at the facility at concentrations equal to or greater than 1% *plus* the quantity of the same NPRI Part 1A substance, at any concentration, that is considered to be a by-product and that is released on site to the environment or disposed of.

When calculating the 10-tonne reporting threshold, **include** the quantity of an NPRI Part 1A substance that is:

- manufactured at a concentration equal to or greater than 1%,
- processed at a concentration equal to or greater than 1%,
- otherwise used at a concentration equal to or greater than 1%, and
- a by-product, at any concentration, released on site to the environment or disposed of on-site or off-site.

Any NPRI Part 1A substances that are transferred off site for recycling and returned to the facility should be treated as the equivalent of newly-purchased material for the purposes of NPRI threshold determinations. Since an NPRI Part 1A substance may undergo many processes in a facility, **care should be taken not to double-count process streams when calculating the reporting threshold**.

NPRI Part 1A Substances Equal to or Greater than 1% Concentration

The total quantity of an NPRI Part 1A substance manufactured, processed or otherwise used at concentrations greater than or equal to 1%, at any time or in any part of the facility, **must** be used in the calculation of the 10-tonne reporting threshold.

The quantity of a substance received by a facility at 30% concentration and then diluted to less than 1% for use, is included in the threshold calculation. A substance received at the facility at less than 1% and subsequently concentrated to 5% would also be included in the threshold calculation.

Facilities that blend or formulate NPRI Part 1A substances such as solvents, must include the total quantity of the substance blended or mixed in the reporting threshold calculation since blending, mixing and formulating are considered processing, which is a reportable activity.

Facilities that repackage or transfer NPRI Part 1A substances between containers need only consider the quantity of the substance repackaged or transferred.

If only a range of concentrations is available for a substance present in a mixture, contact your supplier for more detailed information concerning the substance concentration. If no complementary information is available, use the average of the range for threshold determinations.

NPRI Part 1A Substances of Less than 1% Concentration

The total quantity of an NPRI Part 1A substance manufactured, processed or otherwise used at less than 1% is not included in the calculation of the 10-tonne reporting threshold, provided that the substance was not received as a more concentrated solution and subsequently diluted to less than 1% for manufacturing, processing or other use.

The following example illustrates how to handle substances manufactured, processed or otherwise used at a concentration of less than 1%.

Example
Metal cuttings, sent for disposal, contain alloyed nickel at a concentration of less than 1%. The nickel is an essential component of the alloy; therefore it is not incidentally processed and is not considered to be a by-product. The nickel in the metal cuttings is not included in the calculation of the 10-tonne reporting threshold.

Example of Calculating the Reporting Threshold

The following example (Table 6) illustrates the calculation of the 10-tonne reporting threshold. This facility has several processes in which an NPRI Part 1A substance is manufactured, processed or otherwise used.

Table 6:

EXAMPLE OF THRESHOLD CALCULATION FOR PART 1A SUBSTANCES

Material Containing Part 1A Substance "Z"	Total Weight of Material Containing Part 1A Substance "Z"	Concentration or Equivalent Weight of Part 1A Substance "Z" in the Material or Stream	Net Weight of Part 1A Substance "Z"
Compound material in process stream 1	150 tonnes	5.00 %	7.5 tonnes
Raw material in process 2	2 tonnes	100.00 %	2.0 tonnes
Raw material in process 3	45 tonnes	0.20 %	n/a
By-product released from process 4	10 000 tonnes	0.01 %	1.0 tonne
		Total Weight of Substance "Z"	10.5 tonnes

1. In the first process, the NPRI Part 1A substance "Z" is present at 5% concentration or equivalent weight (for metallic compounds) and is included in the threshold calculation.

2. In the second process, a raw material added to the process is pure substance "Z." It is also included in the threshold calculation, regardless of any subsequent dilution in the process. This also applies to a substance received at the facility at less than 1% which is subsequently concentrated to more than 1% in the process.

3. The weight of substance "Z" in the raw material used in process 3 is not included in the threshold calculation because the concentration is less than 1%. Note, however, that since the facility in this example must report because it meets the 10-tonne reporting threshold, it is required to take into account and report releases, disposals and transfers for recycling from all processes including those, such as process 3, that were not used in the threshold calculations.

4. The weight of substance "Z" produced and released from process 4 is included in the calculation because it is a by-product. The concentration criterion does not apply to by-products for Part 1A substances.

In this example, the facility would be required to submit a report to NPRI (assuming it also met the 20 000-hour employee threshold) because the total amount of substance "Z" manufactured, processed or otherwise used at the facility exceeded 10 tonnes for the calendar year.

3.5 Reporting Criteria for Part 1B Substances

3.5.1 Overview

Part 1B substances include mercury[1], cadmium[1], arsenic[1], hexavalent chromium compounds, lead[2] and tetraethyl lead. These substances are pollutants that have significant environmental and human health impacts at relatively low levels. They occur naturally in the environment, but human activities can concentrate them to levels that are toxic to human health and the environment. Because minimal releases of Part 1B substances may result in significant adverse effects, Environment Canada lowered the concentration and reporting thresholds for Part 1B substances.

[1] and its compounds

[2] and its compounds, except tetraethyl lead (CAS No. 78-00-2); does not include lead (and its compounds) contained in stainless steel, brass or bronze alloys

3.5.2 Substances

The Part 1B substances and their reporting criteria are provided in Table 7, The pure element and any substance, alloy or mixture of any Part 1B substance must be reported as the equivalent weight of the metal itself,with the exception of tetraethyl lead which is reported as the pure compound. For example, a facility that uses potassium chromate ($Cr_2K_2O_7$, molecular weight = 294 g/mol) should only consider the mass contribution of hexavalent chromium (i.e., 102 g/mol) in $Cr_2K_2O_7$ when determining whether it met the reporting threshold for hexavalent chromium.

Note that "tetraethyl lead" and "lead (and its compounds)" both appear on the NPRI Part 1B list. The additional qualifier "does not include lead (and its compounds) in stainless steel, brass or bronze alloys" was added for "lead (and its compounds)" in 2002. Therefore, when submitting a report for "lead (and its compounds)," exclude the lead contribution from tetraethyl lead, stainless steel, brass and bronze alloys. Apply the reporting criteria to each substance separately. If required, complete separate reports for "lead (and its compounds)" and "tetraethyl lead."

3.5.3 Units

The reporting unit for Part 1B substances is kilograms (kg).

3.5.4 Reporting Criteria

The reporting criteria for Part 1B substances are outlined in Figure 5.

A facility is required to report on-site releases, disposals and off-site transfers for recycling of Part 1B substances if, during the 2004 calendar year:

- employees worked a total of 20 000 hours or more or the facility was used for an activity to which the 20 000-hour employee threshold does not apply (listed in Table 5),

and

- a Part 1B substance was manufactured, processed or otherwise used at a concentration and quantity meeting or exceeding the thresholds outlined in Table 7. The total weight of by-products at any concentration must also be included in the calculation of the prescribed threshold for each NPRI Part 1B substance.

Table 7:

MASS AND CONCENTRATION THRESHOLDS FOR PART 1B SUBSTANCES

Substance	CAS Number	Mass Threshold	Concentration Threshold (By Weight)
Mercury[1]	*	5 kg	n/a
Cadmium[1]	*	5 kg	0.1%
Arsenic[1]	*	50 kg	0.1%
Hexavalent chromium compounds	*	50 kg	0.1%
Lead[2]	*	50 kg	0.1%
Tetraethyl lead	78-00-2	50 kg	0.1%

[1] and its compounds

[2] and its compounds, does not include tetraethyl lead or lead contained in stainless steel, brass or bronze alloys

* No single CAS Number applies to this substance.

The 1% concentration exemption included in the 10-tonne manufacture, process or other use threshold for Part 1A substances does not apply to Part 1B substances.

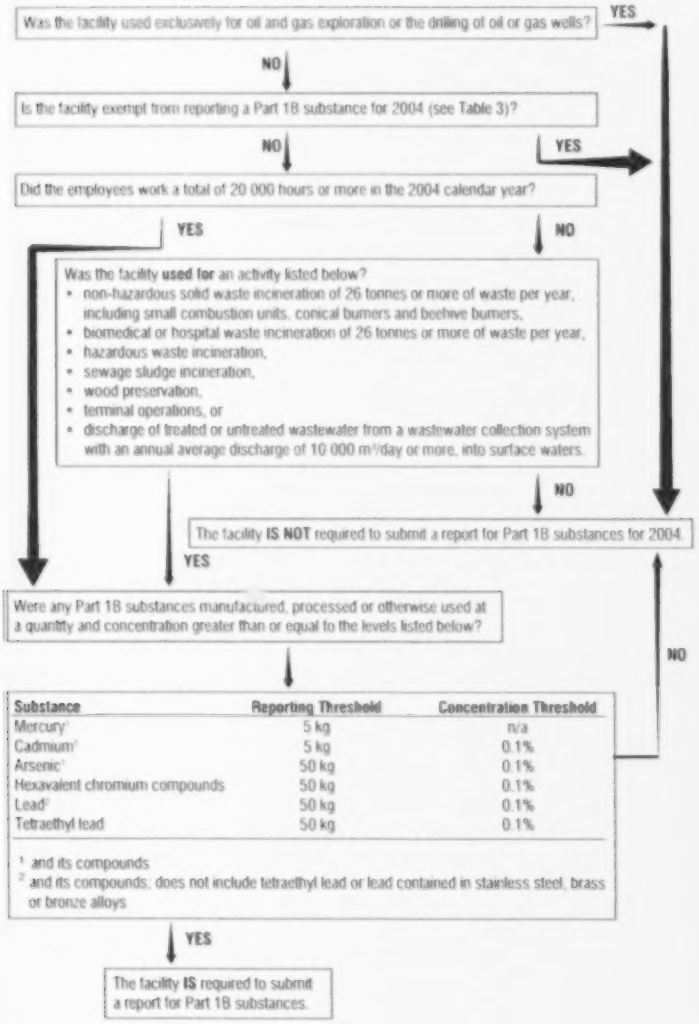
A Material Safety Data Sheet (MSDS) is an important source of information on the composition of a purchased product. Suppliers of hazardous materials are required, as part of the Workplace Hazardous Materials Information System (WHMIS), to supply MSDSs on request. Note that minor constituents at concentrations lower than 1% may not be included on the MSDS.

Once you have determined that your facility is required to submit a report for a Part 1B substance, all releases, disposals or transfers for recycling of that substance are reportable, regardless of the concentration or quantity (including "zero" releases, disposals and transfers for recycling).

Locating and estimating documents listed in the References and Bibliography section provide detailed information for estimating releases, disposals and transfers for some Part 1B substances. The *NPRI Toolbox* contains guidance, examples and tools to assist you with your threshold calculations.

Figure 5:

REPORTING CRITERIA FOR PART 1B SUBSTANCES


Was the facility used exclusively for oil and gas exploration or the drilling of oil or gas wells?
YES
NO
Is the facility exempt from reporting a Part 1B substance for 2004 (see Table 3)?
NO
YES
Did the employees work a total of 20 000 hours or more in the 2004 calendar year?
YES
NO
Was the facility used for an activity listed below?
• non-hazardous solid waste incineration of 26 tonnes or more of waste per year, including small combustion units, conical burners and beehive burners,
• biomedical or hospital waste incineration of 26 tonnes or more of waste per year,
• hazardous waste incineration,
• sewage sludge incineration,
• wood preservation,
• terminal operations, or
• discharge of treated or untreated wastewater from a wastewater collection system with an annual average discharge of 10 000 m³/day or more, into surface waters.
NO
The facility IS NOT required to submit a report for Part 1B substances for 2004.
YES
Were any Part 1B substances manufactured, processed or otherwise used at a quantity and concentration greater than or equal to the levels listed below?
NO
Substance | Reporting Threshold | Concentration Threshold
Mercury[1] | 5 kg | n/a
Cadmium[1] | 5 kg | 0.1%
Arsenic[1] | 50 kg | 0.1%
Hexavalent chromium compounds | 50 kg | 0.1%
Lead[2] | 50 kg | 0.1%
Tetraethyl lead | 50 kg | 0.1%
[1] and its compounds
[2] and its compounds; does not include tetraethyl lead or lead contained in stainless steel, brass or bronze alloys
YES
The facility IS required to submit a report for Part 1B substances.

3.5.5 Definitions

The terms manufacture, process and other use are defined in section 3.4.5 "Definitions."

Article

An *article* is defined as a manufactured item that does not release an NPRI substance under normal conditions of processing or use. This is further explained in section 3.4.5 "Definitions." However, there is no quantitative measure of "due care" in recycling Part 1B substances because even minimal releases of these substances can cause significant adverse effects and can reasonably be expected to contribute to exceeding their low thresholds. Therefore, if an "article" containing a Part 1B substance is processed or used and there were releases, the Part 1B substance *must* be included in the threshold calculation.

Special reporting guidance developed by Environment Canada affects the reporting of Part 1B substances contained in welding rods and welded material. For detailed guidance regarding reporting by this sector, see the *NPRI Toolbox*.

Example 1
A sealed, glass bulb containing mercury used in a leveling switch meets the definition of an article. However, the quantity of mercury in the switch must be included in a facility's calculation of the 5-kg reporting threshold if the item loses its article status, (i.e., the bulb is broken during waste management operations, thus allowing a release of mercury). As long as the bulbs remain intact, they are considered articles and are therefore not included in calculating the reporting threshold.

Example 2
A lead-acid battery meets the definition of an article. A metal reclamation facility accepts spent lead-acid batteries for recycling. The batteries are broken into pieces in a hammermill and their parts (acid, lead and plastic) are subsequently reclaimed. In this context, the batteries lose their article status since they are broken apart during the recycling process. Consequently, the lead content in the batteries must be included in the facility's calculation of the 50-kg reporting threshold.

3.6 Reporting Criteria for Part 2 Substances – 17 Polycyclic Aromatic Hydrocarbons (PAHs)

3.6.1 Overview

Polycyclic aromatic hydrocarbons (PAHs) may be used as commercial chemicals or incidentally manufactured in certain industrial processes. PAHs are listed as a group on the List of Toxic Substances under CEPA 1999.

Since the 17 PAHs listed in Part 2 of NPRI are mostly incidentally manufactured rather than used as commercial chemicals, Environment Canada has set reporting criteria based on releases, disposals and transfers for recycling resulting from their incidental manufacture.

Two PAHs remain on the NPRI Part 1A substance list – anthracene (CAS Number 120-12-7) and naphthalene (CAS Number 91-20-3). These substances are commercial chemicals used in significant quantities, and are less toxic than the 17 Part 2 PAHs added to NPRI at a lower threshold in 2000. As a result, Environment Canada has retained the 10-tonne manufacture, process and other use reporting threshold for anthracene and naphthalene.

3.6.2 Substances

The 17 PAHs listed in Part 2 of NPRI are presented in Table 8.

Table 8:

PART 2 SUBSTANCES (17 PAHs)

CAS No.	Substance Name	CAS Number	Substance Name
56-55-3	Benzo(a)anthracene	224-42-0	Dibenz(a,j)acridine
218-01-9	Benzo(a)phenanthrene	53-70-3	Dibenzo(a,h)anthracene
50-32-8	Benzo(a)pyrene	189-55-9	Dibenzo(a,i)pyrene
205-99-2	Benzo(b)fluoranthene	194-59-2	7H-Dibenzo(c,g)carbazole
192-97-2	Benzo(e)pyrene	206-44-0	Fluoranthene
191-24-2	Benzo(g,h,i)perylene	193-39-5	Indeno(1,2,3-c,d)pyrene
205-82-3	Benzo(j)fluoranthene	198-55-0	Perylene
207-08-9	Benzo(k)fluoranthene	85-01-8	Phenanthrene
		129-00-0	Pyrene

NPRI has an additional substance listing in the NPRI reporting software – "PAHs, total Part 2" – which refers to all 17 PAHs or any combination thereof listed in Table 8. The 17 PAHs may be reported under the substance listing "PAHs, total Part 2" **only** if you do not have information available to estimate releases, disposals and transfers for any of the individual PAHs.

Anthracene and naphthalene are Part 1A substances; as such, their reporting criteria differ from those discussed in this section. Do not include anthracene and naphthalene when determining whether your facility met the reporting criteria for the 17 PAHs listed in Table 8 nor under the "PAHs, total Part 2" listing.

3.6.3 Units

The reporting unit for Part 2 substances is kilograms (kg).

3.6.4 Reporting Criteria

With the exception of wood preservation using creosote, the reporting criteria for PAHs listed in Table 8 are as follows:

- Reporting the 17 PAHs is based on the quantities of the substances *incidentally* manufactured and released, disposed of or transferred, **not** on the quantities manufactured, processed or otherwise used.
- You must aggregate the quantities of **all** 17 individual PAHs incidentally manufactured together in determining if your facility met the 50-kg reporting threshold.

With the exception of wood preservation using creosote (see below), you must submit substance reports for one or more of the 17 PAHs listed in Table 8 that were incidentally manufactured if, during the 2004 calendar year:

- employees worked a total of 20 000 hours or more, or the facility was used for an activity to which the 20 000-hour employee threshold does not apply (listed in Table 5),

and

- any individual PAH (listed in Table 8) was incidentally manufactured, and the sum of all PAHs incidentally manufactured and released on site, disposed of or transferred off site for recycling totalled 50 kg or more.

The substance-specific reporting criteria for the 17 PAHs listed in Table 8 are outlined in Figure 6. Releases, disposals and transfers for recycling must be reported for the individual PAH substances even though the 50-kg reporting threshold applies to the aggregate total of all 17 PAHs.

Wood Preservation Using Creosote – Reporting Criteria

Wood preservation means using heat, pressure treatment or both to apply a preservative to wood, and includes the manufacture, blending or reformulation of wood preservatives for that purpose. The 50-kg reporting threshold does not apply for PAHs released, disposed of or transferred for recycling from a wood-preservation process using creosote because the PAHs are contained in the creosote and not incidentally manufactured.

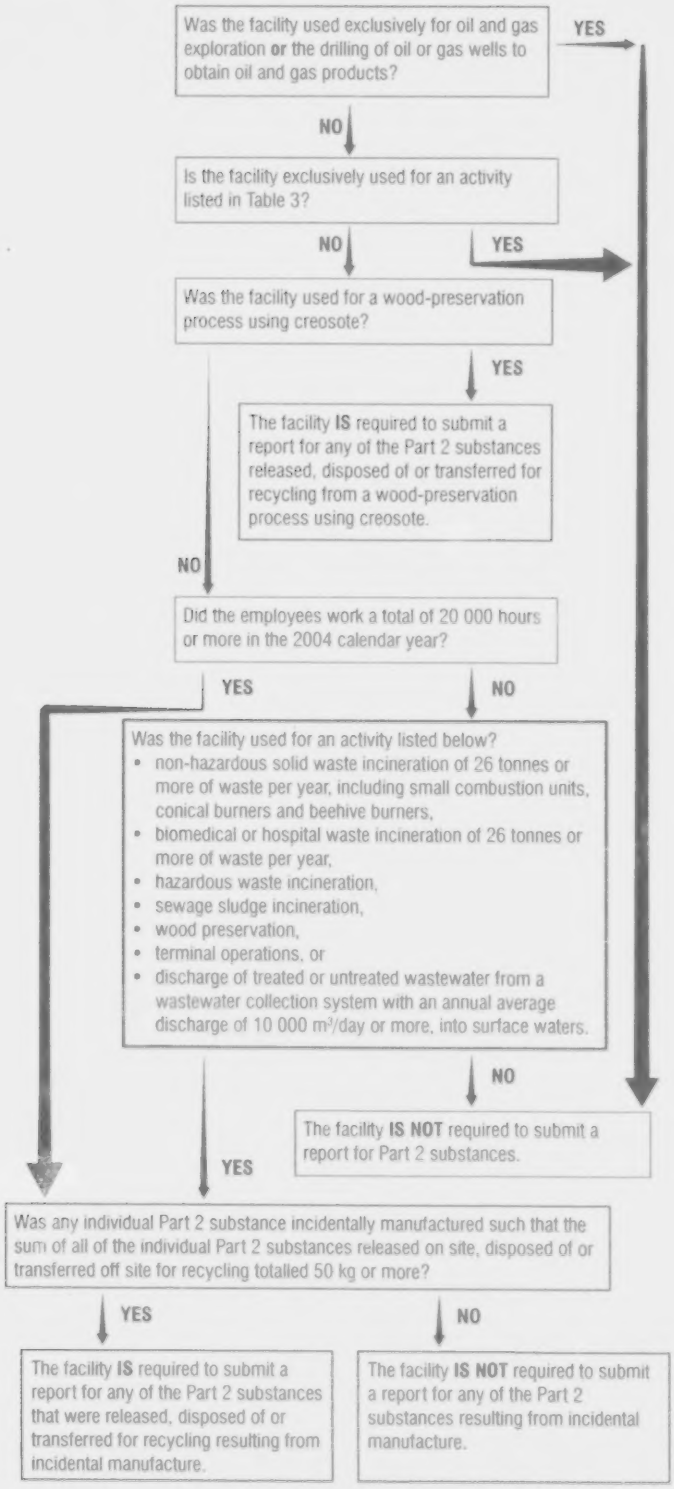
PAHs can consist of up to 90% creosote and for this reason, may be released, disposed of or transferred from most wood-preservation activities using this material.

A wood preservation facility that uses creosote must submit a report for each/any of the 17 individual PAHs released, disposed of or transferred, regardless of the quantity or the number of hours worked by employees.

Environment Canada has prepared a technical guide entitled *Guidance for Wood Preservation Facilities Reporting to the National Pollutant Release Inventory* to assist facilities using creosote for wood preservation to estimate their releases. This technical guide is also available on the NPRI Web site <http://www.ec.gc.ca/npri/>.

Figure 6:

REPORTING CRITERIA FOR PART 2 SUBSTANCES – 17 PAHS


Was the facility used exclusively for oil and gas exploration **or** the drilling of oil or gas wells to obtain oil and gas products?
YES
NO
Is the facility exclusively used for an activity listed in Table 3?
NO
YES
Was the facility used for a wood-preservation process using creosote?
YES
The facility **IS** required to submit a report for any of the Part 2 substances released, disposed of or transferred for recycling from a wood-preservation process using creosote.
NO
Did the employees work a total of 20 000 hours or more in the 2004 calendar year?
YES
NO
Was the facility used for an activity listed below?
• non-hazardous solid waste incineration of 26 tonnes or more of waste per year, including small combustion units, conical burners and beehive burners,
• biomedical or hospital waste incineration of 26 tonnes or more of waste per year,
• hazardous waste incineration,
• sewage sludge incineration,
• wood preservation,
• terminal operations, or
• discharge of treated or untreated wastewater from a wastewater collection system with an annual average discharge of 10 000 m³/day or more, into surface waters.
NO
The facility **IS NOT** required to submit a report for Part 2 substances.
YES
Was any individual Part 2 substance incidentally manufactured such that the sum of all of the individual Part 2 substances released on site, disposed of or transferred off site for recycling totalled 50 kg or more?
YES
NO
The facility **IS** required to submit a report for any of the Part 2 substances that were released, disposed of or transferred for recycling resulting from incidental manufacture.
The facility **IS NOT** required to submit a report for any of the Part 2 substances resulting from incidental manufacture.

3.7 Reporting Criteria for Part 3 Substances – Dioxins/Furans and Hexachlorobenzene (HCB)

3.7.1 Overview

Polychlorinated dibenzo-*p*-dioxins (PCDD or dioxins), polychlorinated dibenzofurans (PCDF or furans) and hexachlorobenzene (HCB) are released primarily as by-products of industrial and combustion processes, but are also found as contaminants in certain pesticides or chlorinated solvents. HCB may also be found as a contaminant in ferric chloride used for water or wastewater treatment. These substances have been identified as toxic substances under the CEPA 1999, and are slated for virtual elimination.

Facilities engaged in identified activities (see Table 10) have the potential to incidentally manufacture dioxins/furans or HCB and are therefore required to submit a report to the NPRI. The identified activities were selected by Environment Canada to cover all main point sources of dioxins/furans and HCB releases being targetted by the *Canada-wide Standards* initiatives for dioxins/furans and HCB. Reporting by specified sectors known to release these substances will capture all significant releases from such facilities, while minimizing the reporting burden on other NPRI reporting facilities.

3.7.2 Substances

Dioxins/Furans

A single substance report is required for the cumulative release of the 17 dioxins/furans congeners; these dioxins/furans congeners and their respective CAS numbers are listed in Table 9. There is no CAS number provided for the dioxin/furan group since the listing includes 17 individual dioxin and furan congeners. A congener is a compound belonging to a family of compounds having similar chemical structures, but differing in the number and position of hydrogen substitutes.

Because these 17 congeners have related, cumulative toxic effects, facilities must report releases, disposals and transfers of dioxins/furans as a group, in grams of international toxicity equivalents (TEQs) relative to the most toxic congener of dioxin (i.e., 2,3,7,8-tetrachlorodibenzo-*p*-dioxin). The quantity in grams of TEQs of dioxins/furans released, disposed of or transferred for recycling is estimated by adding the individual units of TEQ for each congener. A more detailed description of TEQs and their calculation is provided in section 4.8.1 "What Are Toxic Equivalents (TEQs) of Dioxins/Furans?"

TABLE 9:

DIOXIN AND FURAN CONGENERS INCLUDED IN THE NPRI DIOXINS/FURANS GROUP

CAS Number	Name of Congener
	Dioxins
1746-01-6	2,3,7,8-Tetrachlorodibenzo-*p*-dioxin
40321-76-4	1,2,3,7,8-Pentachlorodibenzo-*p*-dioxin
39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-*p*-dioxin
19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo-*p*-dioxin
57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo-*p*-dioxin
35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-*p*-dioxin
3268-87-9	Octachlorodibenzo-*p*-dioxin

TABLE 9: (continued)

DIOXIN AND FURAN CONGENERS INCLUDED IN THE NPRI DIOXINS/FURANS GROUP

	Furans
51207-31-9	2,3,7,8-Tetrachlorodibenzofuran
57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran
57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran
70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran
72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran
57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran
60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran
67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran
55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran
39001-02-0	Octachlorodibenzofuran

Hexachlorobenzene (HCB)

Hexachlorobenzene (HCB) has the CAS Number 118-74-1.

3.7.3 Units

Dioxins/Furans

Report the cumulative quantity of the 17 congeners of dioxins/furans listed in Table 9 in grams of international toxic equivalents (g TEQs). TEQs are further discussed in section 4.8.1 "What Are Toxic Equivalents (TEQs) of Dioxins/Furans?"

HCB

You must report the quantities of HCB in grams (g).

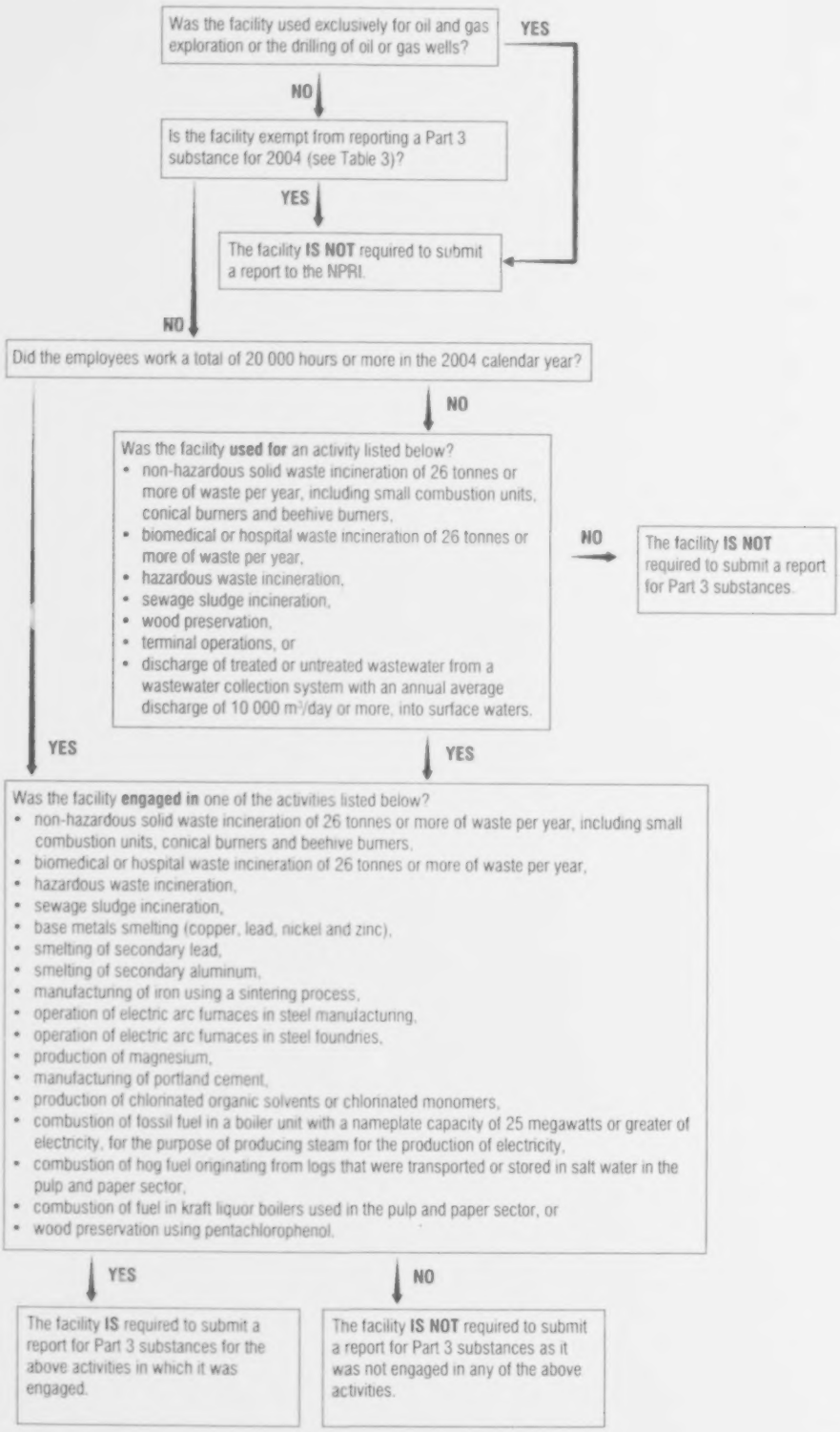
3.7.4 Reporting Criteria

The reporting criteria for dioxins/furans and HCB are summarized in Figure 7.

If a facility was "**engaged in**" an activity listed in Table 10, and the activity occurred at the facility at any time during the year, regardless of the extent or the primary purpose of the facility, then the releases, disposals and transfers of dioxins/furans and HCB must be considered.

Figure 7:

REPORTING CRITERIA FOR PART 3 SUBSTANCES – DIOXINS/FURANS AND HCB


Was the facility used exclusively for oil and gas exploration or the drilling of oil or gas wells?
YES
NO
Is the facility exempt from reporting a Part 3 substance for 2004 (see Table 3)?
YES
The facility IS NOT required to submit a report to the NPRI.
NO
Did the employees work a total of 20 000 hours or more in the 2004 calendar year?
NO
Was the facility used for an activity listed below?
• non-hazardous solid waste incineration of 26 tonnes or more of waste per year, including small combustion units, conical burners and beehive burners,
• biomedical or hospital waste incineration of 26 tonnes or more of waste per year,
• hazardous waste incineration,
• sewage sludge incineration,
• wood preservation,
• terminal operations, or
• discharge of treated or untreated wastewater from a wastewater collection system with an annual average discharge of 10 000 m³/day or more, into surface waters.
NO
The facility IS NOT required to submit a report for Part 3 substances.
YES
YES
Was the facility engaged in one of the activities listed below?
• non-hazardous solid waste incineration of 26 tonnes or more of waste per year, including small combustion units, conical burners and beehive burners,
• biomedical or hospital waste incineration of 26 tonnes or more of waste per year,
• hazardous waste incineration,
• sewage sludge incineration,
• base metals smelting (copper, lead, nickel and zinc),
• smelting of secondary lead,
• smelting of secondary aluminum,
• manufacturing of iron using a sintering process,
• operation of electric arc furnaces in steel manufacturing,
• operation of electric arc furnaces in steel foundries,
• production of magnesium,
• manufacturing of portland cement,
• production of chlorinated organic solvents or chlorinated monomers,
• combustion of fossil fuel in a boiler unit with a nameplate capacity of 25 megawatts or greater of electricity, for the purpose of producing steam for the production of electricity,
• combustion of hog fuel originating from logs that were transported or stored in salt water in the pulp and paper sector,
• combustion of fuel in kraft liquor boilers used in the pulp and paper sector, or
• wood preservation using pentachlorophenol.
YES
NO
The facility IS required to submit a report for Part 3 substances for the above activities in which it was engaged.
The facility IS NOT required to submit a report for Part 3 substances as it was not engaged in any of the above activities.

A facility is required to submit substance reports for dioxins/furans and HCB if:

- the facility was used for one of the activities identified in Table 5 or met the 20 000-hour employee threshold, **and**
- the facility was engaged in one of the activities listed in Table 10.

Facilities used primarily for incineration, or wood preservation using pentachlorophenol, are required to submit substance reports for dioxins/furans and HCB regardless of the number of employee hours worked. A facility used for terminal operations or wastewater collection does not automatically trigger dioxin/furan and HCB reporting. Wastewater collection facilities or terminal operations must also have been engaged in one of the activities in Table 10 to trigger reporting.

Table 10:

ACTIVITIES FOR WHICH DIOXINS/FURANS AND HCB REPORTS ARE REQUIRED (20 000-HOUR EMPLOYEE THRESHOLD APPLIES)

Activity	
a)	non-hazardous solid waste incineration of 26 tonnes or more of waste per year, including small combustion units, conical burners and beehive burners
b)	biomedical or hospital waste incineration of 26 tonnes or more of waste per year
c)	hazardous waste incineration
d)	sewage sludge incineration
e)	base metals smelting (this refers to copper, lead, nickel and zinc)
f)	smelting of secondary lead
g)	smelting of secondary aluminum
h)	manufacturing of iron using a sintering process
i)	operation of electric arc furnaces in steel manufacturing
j)	operation of electric arc furnaces in steel foundries
k)	production of magnesium
l)	manufacturing of portland cement
m)	production of chlorinated organic solvents or chlorinated monomers
n)	combustion of fossil fuel in a boiler unit, with a nameplate capacity of 25 megawatts or greater of electricity, for the purpose of producing steam for the production of electricity
o)	combustion of hog fuel originating from logs that were transported or stored in salt water in the pulp and paper sector
p)	combustion of fuel in kraft liquor boilers used in the pulp and paper sector
q)	wood preservation using pentachlorophenol

A description of what and how you must report is given in sections 4 and 5. Examples of estimation methods and reporting scenarios are provided in the *NPRI Toolbox*. Special reporting requirements for dioxins/furans and HCB are also outlined in section 4.8 "Part 3 Substances – Dioxins/Furans and Hexachlorobenzene (HCB)."

3.7.5 Description of Activities Listed in Table 10

Table 10 Activities (20 000-Hour Employee Threshold Applies)

The first four and final activities in Table 10 (a–d, q) were previously described. For a detailed description of waste incineration and its various classes and wood preservation, see 3.3.2 "Activities to Which the 20 000-hour Employee Threshold Does Not Apply." While reviewing the definitions for waste incineration,

keep in mind that a facility whose primary business activity is not incineration, but which is nonetheless engaged in some form of incineration at the facility, is required to report for dioxins/furans and HCB only if it also met the 20 000-hour employee threshold.

Smelting Activities

Smelting includes the melting of raw or scrap materials (containing metals) to produce metal for further processing into metal products (i.e., castings, ingots, sheets, etc.). The smelting process is typically accompanied by a chemical change in which impurities are removed (i.e., the addition of flux to separate metals from other contaminants).

e) **Base metals smelting**
Base metals refer to copper, lead, nickel and zinc. This activity does not include smelting of aluminum or any other metals. It also does not include the smelting of secondary lead, which is a separate activity listed in Table 10 (see description below).

f) **Smelting of secondary lead**
Secondary lead refers to lead-bearing scrap or lead-bearing materials, other than lead-bearing concentrates derived from a mining operation. Facilities engaged in smelting of lead-bearing concentrates derived from a mining operation are considered to be base metal smelters (see description above).

g) **Smelting of secondary aluminum**
Secondary aluminum refers to aluminum-bearing scrap or aluminum-bearing materials. Secondary aluminum smelting involves two processes – pre-cleaning and smelting – both of which may produce emissions of dioxins/furans.

Other Activities

h) **Manufacturing of iron using a sintering process**
Sintering is the welding together and growth of contact area between two or more initially distinct particles at temperatures below the melting point, but above one-half of the melting point (in Kelvin). In sintering operations, dioxins/furans may be formed as unwanted by-products during high-temperature decomposition and combustion of raw materials containing chlorine and organic compounds.

i) **Operation of electric arc furnaces in steel manufacturing**
In an electric arc furnace, material is heated by the heat energy released from an electric arc. The electric arc is a component of an electric circuit, like a resistor, but with its own peculiar characteristics. Dioxins/furans may be formed as unwanted by-products during high-temperature decomposition and combustion of raw materials containing chlorine and organic compounds.

j) **Operation of electric arc furnaces in steel foundries**
In an electric arc furnace, material is heated by the heat energy released from an electric arc, during which process dioxins/furans and HCB may be formed.

k) **Production of magnesium**
Production of magnesium from magnesium chloride by electrolysis may result in the generation of dioxins/furans and HCB.

l) **Manufacturing of portland cement**
Portland cement is a fine greyish powder consisting of four basic materials – lime, silica, alumina and iron compounds. Cement production involves heating (pyroprocessing) the raw materials to a very high temperature in a rotating kiln to induce chemical reactions that produce a fused material called clinker. The cement clinker is further ground into a fine powder, then mixed with gypsum to form portland cement.

m) Production of chlorinated organic solvents or chlorinated monomers
This activity is limited to the intentional manufacturing of chlorinated organic solvents or chlorinated monomers, and does not include coincidental production.

n) Combustion of fossil fuel in a boiler unit, with a nameplate capacity of 25 megawatts or greater of electricity, for the purpose of producing steam for the production of electricity
This activity includes fossil fuel combustion at electric power-generation utilities and large industrial facilities co-generating electric power using waste heat from industrial processes. *Fossil fuel* means a fuel that is in a solid or liquid state at standard temperature and pressure, such as coal, petroleum or any liquid or solid fuel derivatives, and does not include natural gas or other fuels that are gases at ambient pressure and temperature. Fuel combustion in diesel generators is not captured by this activity.

o) Combustion of hog fuel originating from logs that were transported or stored in salt water in the pulp and paper sector
Pulp and paper boilers burning salt-laden wood are unique to British Columbia. Dioxins/furans are emitted from the burning of salt-contaminated hog fuel. Chlorine is absorbed by the bark of logs transported and stored in salt water. The bark stripped from logs is ground up with other waste wood to produce hog fuel. The material is then used as boiler fuel to produce heat and electrical energy for pulp and paper processes. The *Canada-wide Standards for Dioxins and Furans* state that every boiler covered by the Standards will be tested twice each year to determine the emissions of dioxins/furans to air for the years prior to 2003, and annually for the year 2003 and beyond.

p) Combustion of fuel in kraft liquor boilers used in the pulp and paper sector
A kraft liquor boiler burns black liquor, composed mostly of lignin, which is the residue from the digester in a kraft (sulphate) pulping process. The boiler recovers chemical products, which are later recycled, from the combusted black liquorand also produces steam which is used in mill process operations.

q) Wood preservation using pentachlorophenol
Pentachlorophenol (PCP), by its chemical structure, is a close surrogate to HCB. PCP is derived from HCB by substituting one of HCB's six chloro-substituents with a hydroxyl group. Given its chemical similarity to HCB and that its manufacturing ingredients contain the precursors for dioxin/furan production (i.e., chlorinated aromatics), the manufacture of PCP often results in the incidental manufacture of both HCB and dioxins/furans. Hence, dioxins/furans and HCB are present in PCP formulations used for wood preservation and may be released, disposed of or transferred for recycling when used for wood preservation.

3.8 Reporting Criteria for Part 4 Substances – Criteria Air Contaminants (CACs)

3.8.1 Overview

Environment Canada has been collecting CAC emissions through NPRI since 2002. Governments require CAC emission information in order to assess whether risk-management activities for various industrial sources of CACs are resulting in reduced emissions, and to support the following domestic and international programs:

- Canada-wide Standards for PM and Ozone,
- Canada–US Air Quality Agreement,
- Ozone Annex to the Canada–U.S. Air Quality Agreement,
- Canada-Wide Acid Rain Strategy,
- Convention on the Long-range Transport of Air Pollutants, and
- Development of Ambient Air Quality Objectives.

Information on federal government actions is posted on Environment Canada's Clean Air Web site at <www.ec.gc.ca/air/introduction_e.cfm>.

3.8.2 Substances

Provided their respective reporting criteria are met, substance reports are required for the seven CAC substances – nitrogen oxides, sulphur dioxide, carbon monoxide, volatile organic compounds, total particulate matter, particulate matter with a diameter less than or equal to 10 microns (PM_{10}) and particulate matter with a diameter less than or equal to 2.5 microns ($PM_{2.5}$). The seven CAC substances and their respective CAS numbers, where available, are listed in Table 11.

Table 11:

CRITERIA AIR CONTAMINANTS

CAS Number	CAC Substance
11104-93-1	Nitrogen oxides, NO_x (expressed as NO_2)
7446-09-5	Sulphur dioxide, SO_2
630-08-0	Carbon monoxide, CO
*	Volatile organic compounds, VOCs[1]
*	Total particulate matter, TPM[2]
*	Particulate matter ≤ 10 microns, PM_{10}[2]
*	Particulate matter ≤ 2.5 microns, $PM_{2.5}$[2]

[1] Facilities that met the reporting threshold for VOCs are required to report their air emissions based on the total mass of all VOC substances emitted annually.
[2] Do not include emissions from road dust.
* No single CAS Number applies to this substance.

Nitrogen Oxides (expressed as NO_2)

Nitrogen and oxygen in air at high temperatures can combine to form nitrogen oxides (NO_x). Therefore, fuel combustion and some industrial processes produce NO_x. In addition, nitrogen fuel content affects the amount of NO_x produced. The atmospheric reactions involving NO_x are complex. Nitrogen oxides play an important role in the formation of ground-level ozone. NO_x can react with other contaminants (e.g., ammonia) to form $PM_{2.5}$. NO_x is also a major component of acid rain.

Nitrogen oxides (NO_x) include both nitric oxide (NO) and nitrogen dioxide (NO_2). Since NO_x is a mixture, both NO and NO_2 must be expressed on an NO_2-equivalent basis before the individual quantities are combined for the total NO_x release. Do not include nitrous oxide (N_2O) when calculating your NO_x release.

As with other CAC substances, the release concentration for NO_x (expressed as NO_2) may be in units of parts-per-million volume (ppmv or ppm (volume)). Before you use this value to estimate your emissions, you will need to convert this value to tonnes. This is a two-step process. The first step is to convert the ppmv concentration to a mass-per-unit volume in g/m^3. Once the mass-per-unit volume is determined, the second step is to use the stack flow rate to determine an annual release value from that stack. This process is provided in the *NPRI Toolbox*.

Emission factors for NO_x are available from various emission factor databases and documents, such as the U.S. Environmental Protection Agency's (EPA's) Factor Information REtrieval (FIRE) database and *Compilation of Air Pollutant Emission Factors* (*AP-42*). These references are further described in section 4.2.1 of this Guide. If you are using an emission factor to determine your NO_x release, it is important to determine how the emission is expressed. FIRE, for example, will give you the total NO_x released already expressed as NO_2.

Sulphur Dioxide

Sulphur dioxide (SO_2) is a pollutant formed when sulphur is oxidized and emitted to the atmosphere. Fuel containing sulphur emits SO_2 when it is burned. Common sulphur-containing fuels include coal and oil. SO_2 is also released during metal smelting and other industrial processes. Like NO_x, SO_2 is a precursor to the formation of particulate matter and, subsequently, smog. It is also a major component of acid rain.

Sulphur dioxide belongs to the sulphur oxide (SO_x) family of gases. However, reporting to the NPRI is only required for SO_2, not SO_x. Therefore the quantity of sulphite or sulphur trioxide (SO_3) and sulphate (SO_4) released at your facility should not be considered when calculating your SO_2 release. However, sulphuric acid (H_2SO_4) is listed in the NPRI as a Part 1A substance, and all air releases of sulphuric acid should be considered in the Part 1A calculation for sulphuric acid.

If you are using emission factors to determine your SO_2 release, note that the emission estimation documents and the FIRE database provide some emission factors for both SO_2 and SO_x. Ensure that you use the most applicable emission factor. However, if you only have access to a SO_x emission factor for your process, you can use this emission factor, since the concentration of the other sulphur oxides in the total is generally low.

Carbon Monoxide

Carbon monoxide (CO) is a colourless, odourless, poisonous gas formed during the incomplete combustion of carbon. The rate of CO emissions from combustion sources depends on the overall oxidation efficiency of carbon to carbon dioxide. The presence of CO in the exhaust gases of combustion systems results primarily from incomplete fuel combustion.

Volatile Organic Compounds (VOCs)

Volatile organic compounds (VOCs), as their name implies, are an aggregate grouping of almost 1 000 organic substances that readily volatilize. Some VOCs can undergo photochemical reactions in the atmosphere and contribute to the formation of secondary particulate matter (PM) and ground-level ozone. Elevated concentrations of ground-level ozone and PM in turn generate smog, thereby compromising human health through diminished air quality.

For NPRI purposes, only photochemically-reactive VOCs are included in calculating VOC air emissions. The NPRI definition for VOC is derived from CEPA 1999 and presented in Appendix 5 of this Guide. A list of *non-reactive VOCs* is provided in this Appendix; **these substances do not need to be included in the threshold calculation for VOC releases**. To assist reporters with identifying which VOCs should be included in their calculation, lists of photochemically reactive VOCs are provided in the *NPRI Toolbox*. The list of reactive VOCs increases as new compounds are discovered.

There are many industrial and commercial sources of VOCs, such as loading and unloading of petroleum products, petroleum spills, process venting, spill remediation, flaring of untreated natural gas, evaporative losses from storage tanks, painting and stripping activities, degreasing activities, burning fuel (e.g., oil, wood, coal, natural gas), solvents and wood preservatives.

For the purposes of reporting to the NPRI, it is important to note the following:

- Approximately 100 VOC substances are listed in the NPRI as individual substances under Part 1A with a 10-tonne manufacture, process or other use reporting threshold. You must report these Part 1A substances if criteria are met; you must also include these substances in your threshold calculations for Part 4 VOCs, along with *all* other VOC substances emitted at your facility during 2004.
- Table 12 provides examples of VOC categories and individual VOCs, and the *NPRI Toolbox* provides lists of VOCs.

- When reporting to the NPRI, your estimate for VOC air emissions must be based on **the total mass of all VOC substances** emitted annually at your facility.
- In addition to total VOCs, facilities may be required to report additional information for some species of VOCs (speciated VOCs). Refer to section 3.9 "Reporting Criteria for Part 5 Substances – Speciated Volatile Organic Compounds (VOCs)" for more information.

Table 12:

SOME EXAMPLE CATEGORIES OF VOLATILE ORGANIC COMPOUNDS

Category	Example Compounds
Alcohols	Ethanol Isopropyl alcohol Methanol
Alkanes	*n*-Butane Propane Octane
Alkenes	Ethylene Propylene Isobutene trans-2-Pentene
Alkynes	Acetylene
Aromatics	Benzene Benzo(a)pyrene Fluoranthene Toluene 1,2,4-Trimethylbenzene Xylene (all isomers)
Aldehydes	Formaldehyde Acetaldehyde
Ketones	Methyl isobutyl ketone
Ethers	Methyl *tert*-butyl ether Tripropylene glycol monomethyl ether
Esters	Dimethyl phthalate Dibutyl phthalate

Particulate Matter

Particulate matter is any solid particle found in the air. Particulate matter in the atmosphere reduces visibility and forms smog in conjunction with other pollutants when certain weather conditions are present. Smaller-sized particulate matter can be inhaled and may cause respiratory problems. Particulate matter may be released directly into the atmosphere or formed secondarily in the atmosphere from precursors as a result of physical or chemical transformations. Primary particulate matter (primary PM), as measured using U.S. EPA Method 5 or 5a, includes both filterable and condensable PM. Of these, only **filterable PM** is reportable to NPRI. Emission factors exist for primary PM, condensable PM and filterable PM; ensure you are using the correct factor. Do not include road dust emissions in your particulate matter estimates.

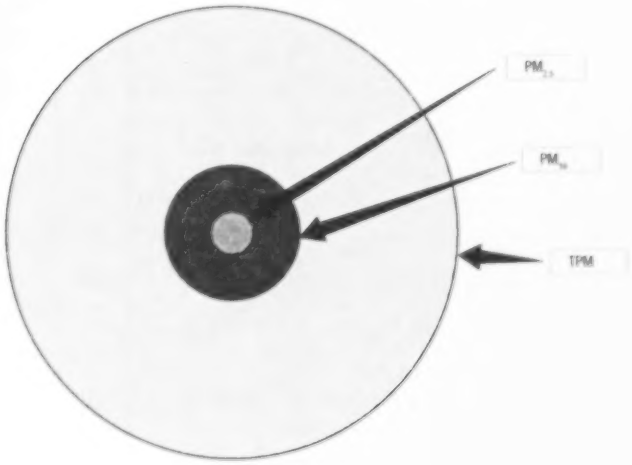
NPRI requires reporting for three size fractions of particulate matter:

- total particulate matter with a diameter less than 100 microns (TPM),
- particulate matter with a diameter less than or equal to 10 microns (PM_{10}), and
- particulate matter with a diameter less than or equal to 2.5 microns ($PM_{2.5}$).

As shown in Figure 8, the TPM fraction includes PM_{10} and $PM_{2.5}$, while PM_{10} includes $PM_{2.5}$. For this reason, it is impossible for $PM_{2.5}$ or PM_{10} releases to exceed TPM because TPM includes both of these fractions. It is also impossible for $PM_{2.5}$ releases to exceed PM_{10} as PM_{10} includes $PM_{2.5}$. Therefore, a calculation error has occurred if $PM_{2.5}$ releases exceed PM_{10} or TPM. Emission factors are published for each of the specific particulate fractions. As such, at no time should the particulate emissions estimated by each fraction-specific emission factor be added together. For example, PM_{10} should never be added to $PM_{2.5}$. Likewise, PM_{10} and $PM_{2.5}$ should never be added to yield TPM.

Figure 8:

SIZE FRACTIONS OF PARTICULATE MATTER



PM_{10} may be released directly into the atmosphere or formed secondarily in the atmosphere from precursors as a result of physical or chemical transformations. $PM_{2.5}$, also referred to as fine particulate, is the fraction of particulate matter recognized as having the greatest adverse effect on human health.

Particulate matter is formed in various industrial and non-industrial processes. Some common sources of particulate matter include burning of fuels in combustion units, separation processes, land treatment, mine tailings and storage piles. Wet stacks release considerable amounts of water/steam into the atmosphere from which particulate matter can form. However, for the purposes of NPRI, TPM, PM_{10} and $PM_{2.5}$ emissions should be reported on a dry basis. Guidance for wet cooling towers and PM reporting is available in the *NPRI Toolbox*.

In some cases, TPM emissions may be available (from testing or emission factors), but size distribution may not. The U.S. EPA software tools PM Calculator and SPECIATE contain particle size distribution information and size-specific control information for control devices. These tools may be used to estimate the PM_{10} and $PM_{2.5}$ emissions from a process and can be found on the U.S. EPA's Web site at <www.epa.gov/ttn/chief/software/>, which is hyperlinked from the *NPRI Toolbox*. Read the documentation accompanying the software applications for information on preparing the input files.

In other cases, emission factors are available for PM_{10} and $PM_{2.5}$, but not for TPM. In the absence of other information, the PM_{10} emission factor may be assumed to be the same as the TPM emission factor. Similarly, if an emission factor is only available for $PM_{2.5}$, that factor can be used for PM_{10} and TPM estimates.

3.8.3 Units

Report quantities for CACs released to air in tonnes.

3.8.4 Reporting Criteria

The reporting criteria for CACs are described in Table 13.

Table 13:

RELEASE THRESHOLDS FOR CRITERIA AIR CONTAMINANTS

CAS Number	CAC Substance	Substance Threshold
11104-93-1	Nitrogen oxides, NO_x (expressed as NO_2)	20 tonnes
7446-09-5	Sulphur dioxide, SO_2	20 tonnes
630-08-0	Carbon monoxide, CO	20 tonnes
*	Volatile organic compounds, VOCs[1]	10 tonnes
*	Total particulate matter, TPM[2]	20 tonnes
*	Particulate matter ≤ 10 microns, PM_{10}[2]	0.5 tonnes
*	Particulate matter ≤ 2.5 microns, $PM_{2.5}$[2]	0.3 tonnes

[1] Facilities that met the reporting threshold for VOCs are required to report their air emissions based on the total mass of all VOC substances emitted annually.
[2] Do not include emissions from road dust.
* No single CAS Number applies to these substances.

If your facility was engaged in an activity exempt from reporting NPRI Parts 1 through 3 substances, you may be required to report for CAC emissions from stationary combustion equipment. For the purposes of NPRI, stationary combustion equipment includes any combustion equipment that needs to be stationary to function or operate properly, or is not capable of self-propulsion. For example, a portable generator that had to be hard wired into the process and bolted down to eliminate vibrations during operation would be considered stationary. Both internal and external combustion equipment should be considered in the stationary combustion equipment category. Stationary combustion equipment is further described in section 3.8.6 "Sources of CACs."

3.8.5 Sources of CAC Emissions to Consider When Determining if Your Facility Met the Threshold

The first step in determining if your facility met the CAC reporting threshold is to identify what emission sources should be included in your calculation. As shown in Figure 3, two possible scenarios must be considered. In Case 1, all CAC emission sources at the facility must be included in the calculation; in Case 2, only the releases from the stationary combustion equipment at the facility must be included. Each case is described below.

Case 1: Consider All Sources of CAC Emissions at the Facility

You are required to consider all sources of CAC emissions at your facility, including stationary combustion equipment, if your facility met the following criteria:

- a contiguous facility or offshore installation at which employees worked 20 000 hours or more, or
- a facility used for an activity listed in Table 5 of section 3.3.2 (or Box 2 of Figure 3), regardless of the hours worked by employees.

Additionally, CAC emissions from stationary combustion equipment used in the activities listed in Table 5 must be included when determining whether your facility met a CAC threshold and when reporting to the NPRI. However, emissions from the sources listed in Table 4 of section 3.2.3 should not be included in your estimate.

Case 2: Consider Only CAC Emissions from Stationary Combustion Equipment

Facilities need consider emissions from stationary combustion equipment only if:

- employees worked less than 20 000 hours, or
- the facility was used exclusively for an activity listed in Table 3 of section 3.2.2 (or Box 1 of Figure 3), or
- the facility is a pipeline installation.

Exclusion from Reporting for Case 2 Facilities

If you are a Case 2 reporter, you are **not** required to submit a report to the NPRI for any CAC, if *all* the following criteria are met:

- the CAC substances were only emitted to air at the facility from stationary, external combustion equipment, **and**
- the cumulative nameplate capacity of **all** stationary, **external** combustion equipment was less than 10 million BTU/hour (10.55 million kJ/hour), **and**
- the only type of fuel combusted in that equipment was commercial grade natural gas, liquefied petroleum gas, Number 1 or 2 fuel oil or any combination thereof.

This exclusion does not apply if any fuel other than commercial grade natural gas, liquefied petroleum gas, Number 1 or 2 fuel oil or any combination thereof was also burned in the stationary, external combustion equipment. Definitions for important terms used in the exclusion can be found in the glossary.

A report is required for each CAC substance emitted (released to air) in a quantity greater than or equal to the threshold listed in Table 13 .

In contrast to the majority of NPRI substances, the **thresholds for CAC emissions are based on the quantity released to air**, rather than on the quantity manufactured, processed or otherwise used. For the 2004 reporting year, facilities meeting the reporting thresholds for CACs (e.g., VOCs) are required to report air emissions based on the total mass emitted during the year.

3.8.6 Sources of CACs

Stationary Combustion Equipment

NPRI requires reporting for stationary combustion equipment at the facility. For the purpose of reporting to NPRI, **stationary combustion equipment** refers to any combustion equipment that needs to be stationary to function or operate properly or is not capable of self-propulsion. Both internal and external combustion equipment can fall into the stationary category.

The sum of the contribution from a number of smaller sources should not be overlooked. If your facility has a number of smaller sources, you are still required to calculate your combined release from all sources to determine if you are required to submit a report to NPRI for CACs.

External Combustion Equipment

An *external combustion unit* is defined as any equipment with a combustion process that occurs at atmospheric pressure and with excess air. Equipment that may fall within this definition includes heaters, furnaces, incinerators, boilers, flares, combustion chambers, external combustion engines such as steam engines and Stirling engines, steam/electric generating plants and other commercial units. Emission factors for many of these sources can be obtained from FIRE and *AP-42*. In addition, Environment Canada has developed spreadsheets to assist reporters with their NPRI reporting for external combustion of various fuel types. These spreadsheets can be accessed through the *NPRI Toolbox*.

Internal Combustion Equipment

Internal combustion units are identified as those in which combustion of the fuel takes place in a confined space and above atmospheric pressure. The expanding gases produced by the combustion are used to provide mechanical power. Some examples of stationary internal combustion equipment include, but are not limited to, gas turbines, natural gas-fired reciprocating engines, gasoline and diesel industrial engines and large, stationary diesel and dual-fuel engines. Emission factors for many of these sources can be obtained from FIRE and *AP-42*. In addition, Environment Canada has developed a spreadsheet to assist reporters with their NPRI reporting for internal combustion of diesel fuel. This spreadsheet can be accessed through the *NPRI Toolbox*.

Storage Tank Emissions

CAC emissions may result from any storage tank containing fuels, solvents, hydrocarbons, paints and other solutions that contain VOC substances. These fugitive emissions are the result of the evaporation of stored substances. The rate of evaporation depends on the type of storage tank, ambient conditions, as well as the vapour pressure of the substance(s). Generally, there are six basic tank designs that are used for organic liquid storage vessels – fixed roof (vertical and horizontal), external floating roof, domed external (or covered) floating roof, internal floating roof, variable vapour space, and pressure (low and high). A brief description of each tank and its associated vapour-loss mechanisms is provided in Appendix 6.

As noted in Figure 3, **when reporting CACs (Part 4 substances), do not consider fugitive emissions resulting from the distribution, storage or retail sale of fuels, except as part of terminal operations**. Fugitive emissions from storage tanks are to be included in the Part 4 substance threshold calculations (VOCs) only for terminal operations.

The U.S. EPA's TANKS software, available at <http://www.epa.gov/ttn/chief/software/tanks/index.html>, may be used to estimate emissions from storage tanks at terminal operations. For common fuels, there is default information available. Otherwise, the procedure outlined in the U.S. EPA's documentation should be followed.

Other Sources of Emissions

Combustion is not the only source of CAC emissions. It is, however, the major source of industrial and commercial CAC emissions. To assist in identifying other sources at your facility, the following section has been prepared. Note that the sources discussed in this section do not constitute a comprehensive list. CAC emissions from sources other than those discussed here should be considered when determining if the facility met the substance threshold.

- **Storage Piles**
  Storage piles are a source of fugitive CAC emissions, because handling the piles generates particulate matter emissions. Pile moisture content, wind speed and proportion of aggregate fines all influence the total emissions released from a storage pile.

Refer to chapter 13, subsection 13.2.4, in the U.S. EPA's *AP-42* document for further information on emissions from storage piles. (Reference: <www.epa.gov/ttn/chief/ap42/ch13/final/c13s02-4.pdf>). NPRI has also developed a spreadsheet for material handling operations, in order to assist reporters with estimating their releases from aggregate storage piles; this spreadsheet can be accessed through the *NPRI Toolbox*. Note that this spreadsheet is based on the equation referred to in the *AP-42* document above and, therefore, is not suitable for estimation of particulate releases from sawdust piles.

- **Loading/Unloading**
  Fugitive CAC emissions can result from the loading and unloading of vehicles or containers. If the material being transferred is a liquid, the resulting emissions would likely be in the form of VOCs. If the material is a solid, the resulting emissions would likely be in the form of particulate matter.

  Emission factors are available for calculating the release from loading or unloading either a solid or liquid material. (Reference: <www.epa.gov/ttnchie1/eiip/techreport/volume03/iii12_apr2001.pdf>).

- **Fermenting**
  The process of fermentation involves the use of yeast, bacteria, enzymes, etc., to break down complex organic compounds into intermediate or final products. Many industries, including those involved in the production of bread, spirits, pharmaceuticals, fuel, beer, wine and environmental bioremediation processes, use the fermentation process. Emission factors and mass balances can be used to estimate the CAC emissions using the formula presented in the U.S. EPA's methodology. (Reference: <www.epa.gov/ttn/chief/ap42/ch09/final/c9s09-6.pdf>). In addition, NPRI has developed spreadsheets for some fermentation processes including those used in breweries and bakeries; these spreadsheets are available through the *NPRI Toolbox*.

- **Painting**
  Volatile organic compounds are released from paint during its application and drying. This category includes, but is not limited to, the painting of vehicles, furniture, storage tanks and any other painted product. $PM_{2.5}$ may also be emitted if paint is applied by pulverization.

  It is possible to estimate the VOC release by assuming that the entire VOC content of the paint and solvents is released. The percentage of total or individual VOCs in the paint and solvents used is normally listed on the MSDS for the products. If not, you may obtain this information from your supplier. The total release then would be equal to the VOC percentage multiplied by the total weight of the paint used. Generic emission factors are also available for painting and coating processes. However, consult the coatings' manufacturer to determine if an emission factor specific to the product used is available. (References: www.epa.gov/ttn/chief/eiip/techreport/volume02/ii07_july2001.pdf > and chapter 4.2 of *AP-42*, which concerns surface coating). NPRI has also developed a spreadsheet to assist reporters with estimating their NPRI releases from spray painting; this spreadsheet is available through the *NPRI Toolbox*.

- **Abrasive Blasting**
  Abrasive blasting is the process of cleaning or texturing materials such as metals and ceramics with an abrasive material. Sand is the common abrasive used in blasting. However, coal, smelter slag, mineral, metallic and synthetic abrasives are also used. The blasting process itself is a source of particulate matter emissions, especially PM_{10} and $PM_{2.5}$.

  Emission factors and mass balances can be used to estimate CAC emissions using the formula presented in the U.S. EPA's methodology. (Reference: <www.epa.gov/ttn/chief/ap42/ch13/final/c13s02-6.pdf>). An abrasive blasting spreadsheet has also been developed to assist reporters with estimating releases from this activity and can be accessed through the *NPRI Toolbox*.

- **Equipment Leaks**
  Equipment connections, joints and interfaces can be the source of both gaseous and liquid releases. If the equipment is handling a gaseous stream containing a CAC substance, the gaseous leak would result in a fugitive CAC release. Depending on the properties of a liquid (such as vapour pressure, temperature and pressure), the liquid release may also result in a fugitive CAC emission.

  Emission factors are available for estimating the release of CAC substances from equipment leaks (References: <www.epa.gov/ttn/chief/eiip/techreport/volume02/ii04_a.pdf > and <www.epa.gov/ttn/chief/eiip/techreport/volume02/ii04_b.pdf>).

- **Open Burning**
  Open burning consists of the burning of any material in a pit or pile, including the open burning of fuel used for fire-fighting training purposes. The material being burned is not contained in any structure and is completely open to the atmosphere.

  Open burning can release any or all seven of the CACs. Emissions from this activity are often estimated using emission factors. (Reference: <www.epa.gov/tnnchie1/eiip/techreport/volume03/iii16_apr2001.pdf>).

  If no specific information is available on open burning of fuel, emission factors developed for specific fuels combusted in boilers can be used interchangeably to estimate emissions from the open burning of fuel. Information on fire training and open burning of certain fuels can be found on the Australian NPI Web site at <www.npi.gov.au/index.html>.

- **Solvent Use**
  Solvent use includes, but is not limited to, solvent degreasing, waste solvent reclamation, fugitive emissions during product formulation and commercial solvent use. Many solvents contain VOCs that are released during use and storage through evaporation.

  Emission factors, mass balances, and engineering estimates are often used to estimate VOC emissions from solvent use. Descriptions of these estimation methods are available in section 4.4 of this Guide. (Reference: <www.epa.gov/ttn/chief/ap42/ch04/final/c4s06.pdf>).

3.9 Reporting Criteria for Part 5 Substances – Speciated Volatile Organic Compounds (VOCs)

3.9.1 Overview

The key reason for collecting emission data on individual VOCs (speciated VOCs) is to assist regional air quality modelling. This data also serves the various domestic and international programs described in section 3.8 that require information on trends and forecasts of emission data.

3.9.2 Substances

To fulfill the obligation of VOC speciation reporting (Part 5 substances), facilities must first account for and report releases of Part 4 total VOCs. If the facility meets the total VOC threshold, it must consider whether it also needs to report for the 60 speiciated VOCs listed in Appendix 1.

The U.S. EPA software SPECIATE contains VOC distribution information for some processes. This software, located at <www.epa.gov/ttn/chief/software/>, may be used to estimate the distribution/profile of speciated VOCs from a process. A hyperlink is also available from the *NPRI Toolbox*. Read the documentation accompanying the software for information on preparing the input files.

It should be noted that Total Organic Compounds (TOCs) and VOCs do not have the same definition. All VOCs can be considered TOCs; however, not all TOC species are considered VOCs. For example, acetone is considered a TOC but it does not meet the definition of a VOC. If you are using the SPECIATE 3.2 program to calculate your speciated VOC values for NPRI Part 5 substances, ensure that you include in your report only the TOC species that meet the VOC definition.

3.9.3 Units

Report quantities for speciated VOCs released to air in tonnes.

3.9.4 Reporting Criteria

Speciated VOC reporting only needs to be considered by facilities that met the 10-tonne air-release threshold for VOCs under the reporting criteria for Part 4 substances. If this threshold was met, the facility must determine whether it needs to report for any of the VOCs listed in Part 5. To minimize the reporting burden, a minimum threshold of 1 tonne was established for speciated VOC reporting.

Therefore, if a facility met the 10-tonne total VOC threshold, it must report for all VOCs listed in Part 5 that were released to air in a quantity greater than or equal to 1 tonne.

You have now completed Step 1 and should know whether you are required to report to the NPRI and, if so, for which substances.

Note that if your facility met the reporting criteria, you must submit a report even if on-site releases, disposals or off-site transfers for recycling of NPRI substances were zero.

Threshold calculations for Part 1–3 substances do not need to be reported to the NPRI. Their purpose is to determine the substance(s) for which a facility is required to report releases, disposals and transfers for recycling. Keep this information in your files. Persons reporting to the NPRI for 2004 are required to retain copies of all information on which their report was based, including any calculations, measurements or other data, at the facility or parent company in Canada, for three years.

If You Are Required to Report

If you have determined that you are required to report for your facility, continue to Step 2. You will also need to consult the *NPRI Software Guide* in order to prepare and submit your NPRI report. If you have questions, contact your regional NPRI office (see listings on the inside front cover).

You are legally required to submit your NPRI report to your regional NPRI office, postmarked, courier-dated or e-mailed no later than **June 1, 2005**. If you do not have access to a computer, a paper reporting form can be provided by your regional NPRI office. Extra copies of the reporting package can also be ordered from your regional NPRI office. Note: Use of the paper forms frequently results in reporting errors and subsequent follow-up by Environment Canada. Use of the reporting software is strongly recommended.

If You Are Not Required to Report

If you have concluded that you are not required to report for your facility, either because it was used for an exempt activity or it did not meet all reporting criteria, advise your regional NPRI office (listed on the inside front cover) to update its records and mailing lists.

Facilities that submitted a report to the NPRI for the 2003 reporting year are legally required to notify Environment Canada prior to the June 1 deadline, if they are not required to report for the 2004 reporting year.

4. Step 2 – Estimate Releases, Disposals and Transfers for Recycling, and Collect the Information Required for the NPRI Report

The second step is to estimate your releases, disposals and transfers and collect the information required to complete the NPRI report. Different categories of releases, disposals and transfers are listed in section 5.2.1 of this Guide.

This section outlines different methods and sources of information available to assist you in estimating releases, disposals and transfers for recycling NPRI substances that you are required to report.

The 2004 *Canada Gazette* notice states that the information required by the NPRI need only be reported to the Minister of the Environment if the facility owner or operator possesses the information or may reasonably be expected to have access to the information. **Consequently, NPRI does not require additional monitoring or measurement of the quantities or concentration of substances released to the environment beyond the monitoring and measurement already required under the provisions of other laws or regulations.** You are, however, required to submit a comprehensive report using the best available data and information in response to the 2004 *Canada Gazette* notice.

4.1 Retain Information Collected

Persons reporting to the NPRI for 2004 are required to retain copies of all information upon which their report was based, at the facility or parent company in Canada, for three years.

4.2 Sources of Information

4.2.1 Technical Guides

The References and Bibliography section contains a list of technical guidance documents that can be consulted for information on certain substances or processes. This includes technical guides prepared by Environment Canada, the U.S. EPA and industry associations. The *NPRI Toolbox* contains example calculations using different estimation methods, complete case studies, automated calculation spreadsheets for several processes (mainly for criteria air contaminants (CACs), polycyclic aromatic hydrocarbons (PAHs), dioxins/furans and hexachlorobenzene (HCB) estimation), additional guidance (cooling towers, welding, etc.), lists of volatile organic compounds (VOCs) and descriptions of tools available to assist you with your threshold calculations. Many references for CAC estimation have already been mentioned in Sections 3.8.5 and 3.8.6 of this Guide.

Environment Canada has also prepared a guidance document for the wastewater sector titled *Reporting Guidance for the Wastewater Sector to the National Pollutant Release Inventory*. This document helps wastewater collection facilities estimate releases, disposals and transfers of NPRI substances commonly emitted by this sector.

In addition, Environment Canada has published a technical guide to assist facilities in the wood-preservation sector estimate their releases of certain substances. The document, *Guidance for Wood Preservation Facilities Reporting to the National Pollutant Release Inventory*, provides a step-by-step methodology for estimating releases, disposals and transfers for recycling of NPRI substances, including PAHs, dioxins/furans and HCB, from wood preservation facilities. This document does not cover all CACs released from the wood preservation process. Chapter 10.8 "Wood Preserving" of the U.S. EPA's *AP-42* document (Reference: <www.epa.gov/ttn/chief/ap42/ch10/final/c10s08.pdf>), can be consulted for assistance with estimating other CAC releases as well as PAHs, from the wood preservation process.

These guides are available in electronic format at the NPRI Web site, <www.ec.gc.ca/npri/>, and in hard copy from your regional NPRI office.

4.2.2 Material Safety Data Sheet (MSDS)

A Material Safety Data Sheet (MSDS) is an important source of information on the composition of a purchased product. Suppliers of hazardous materials are required, as part of the Workplace Hazardous Materials Information System (WHMIS), to supply MSDSs on request. Note that the goal of the MSDS is to protect the health of the workers, not the environment. Therefore, an MSDS may not list all product ingredients that may be reportable to the NPRI. You can contact your supplier for more detailed information on product composition.

4.2.3 U.S. EPA Software – FIRE, *AP-42* and SPECIATE

The U.S. EPA's Factor Information REtrieval (FIRE) database contains emission factors for a number of NPRI substances including, but not limited to, CACs, mercury (and its compounds), individual PAHs, dioxins/furans and HCB. The FIRE database is further explained in the *NPRI Toolbox*. Both the metric and bilingual Canadian version of FIRE (version 6.23) and the recent American version (version 6.25) are available from the *Toolbox*.

In addition, the EPA's *Compilation of Air Pollutant Emission Factors* (*AP-42*) provides further context for the emission factors listed in the FIRE database. The sector-specific chapters in *AP-42* provide an overview of an industry's processes, its pollution sources and the control measures available to achieve reductions in emissions. These documents can be retrieved at the following Web address: <www.epa.gov/ttn/chief/ap42/index.html>.

SPECIATE (version 3.2, released in November 2002) is the U.S. EPA's repository of total organic compound (TOC) and particulate matter (PM) speciated profiles for a variety of sources for use in source-apportionment studies. This software will assist reporters with speciated VOC reporting (Part 5 substances) and can be downloaded at the following Web address: <www.epa.gov/ttn/chief/software/index.html>. You can browse through the Profiles and search by keyword.

4.2.4 Industry Associations

If you are a member of a regional or national industry association, you may also have access to emission factors, guidance and other calculation tools through that organization.

4.2.5 Permits and Certificates of Approval

Municipal, provincial, territorial or regional operating permits and certificates of approval may be another source of information on substances at your facility.

4.3 Method Detection Limit (MDL)

There are several situations in which the issue of measurements below the method detection limit (MDL) arise in NPRI reporting. The MDL is the smallest concentration of the substance under analysis (analyte) that produces an instrumental response and that meets all analyte detection and identification criteria of a specified test method.

Dealing with Multiple Data Points and Non-detected Values

Facilities must use reasonable judgment as to the presence and amount of an NPRI-listed substance based on the best readily available information. An indication that a reportable substance was below the MDL is not equivalent to stating that the substance was not present. If it is known that the substance was present, a concentration equivalent to half of the MDL should be used. Persons at a facility should not estimate releases solely on measurement or monitoring devices; they should also rely on their knowledge of specific conditions at the facility.

Where, during the year, multiple measurements of a substance in a given process stream were all below the MDL, and the facility has no other reason to believe that the substance was present, the facility should assume that the concentration of the substance in that process stream was zero.

Where, over a year, multiple measurements were taken in a given process stream and some indicated that the substance was above and some were below the MDL, the facility has good reason to assume that the substance was present. The facility should, therefore, use a concentration value of half the MDL for those measurements where the concentration was below the MDL.

4.4 Methods of Estimation

Estimates of the quantity of a substance that was manufactured, processed or otherwise used, and the quantity that was released, disposed of or transferred, may be based on one of the following methods:

- Continuous Emission Monitoring Systems (CEMS) (Code M1 in reporting form),
- Predictive Emission Monitoring (PEM) (Code M2),
- source testing (Code M3),
- mass balance (Code C),
- site-specific emission factor (Code E1),
- published emission factor (Code E2), or
- engineering estimates (Code O).

When you report on-site releases, disposals and off-site transfers, you are required to enter the method of estimation in the NPRI reporting software. The estimation codes recognized by the software are provided in brackets above; their purpose will be self-evident when you complete your NPRI report. A description of the available estimation methods is provided below; examples employing these estimation methods are provided in the *NPRI Toolbox*.

4.4.1 Continuous Emission Monitoring Systems (CEMS)

Continuous Emission Monitoring Systems (CEMS) record emissions/releases over an extended and uninterrupted period. Various methods are employed to measure the concentration of contaminants in the effluent or gas stream. Once the contaminant concentration and the flow rate have been determined, release or emission rates can be calculated by multiplying the contaminant concentration by the discharge flow rate or volumetric stack gas flow rate. Annual releases of the contaminant can then be estimated by multiplying the contaminant concentration by the annual flow rate of the discharged effluent or gases in the stack or duct.

4.4.2 Predictive Emission Monitoring (PEM)

Predictive Emission Monitoring (PEM) is based on developing a correlation between contaminant release/emission rates and process parameters (e.g., fuel usage, steam production, furnace temperature). PEM may be considered a hybrid of continuous monitoring, emission factors and stack tests. A correlation test must first be performed to determine the relationship between contaminant emission rates and process parameters. Releases/emissions can then be calculated or predicted using process parameters to predict release/emission rates based on the results of the initial source test.

4.4.3 Source Testing

Source testing involves collecting a sample of the emission or effluent, then determining the concentration of one or more substances in the sample. The concentration of the substance(s) of interest are then multiplied by the volumetric flow rate to determine the amount of the substance(s) emitted over time. Source testing of air emissions generally involves inserting a sampling probe into the stack or duct to collect a volume of exhaust effluent isokinetically. The contaminants collected in or on various media are subsequently analyzed. For liquid effluents, grab samples or 24-hour composite samples are extracted from the effluent stream.

Source testing is often conducted as a regulatory requirement for provincial, territorial or regional authorities.

4.4.4 Mass Balance

Mass balance applies the law of conservation of mass to a facility, process or piece of equipment. If there is no accumulation, then all the materials that go into the system must come out. Releases are determined from the difference in the input and output of a unit operation where the accumulation and depletion of a substance are included in the calculations.

The general equation for a mass balance is:

$$M_{in} = M_{out} + M_{accumulated/depleted}$$

Where:

M_{in} = Mass of compound in the raw material feed
M_{out} = Mass of compound in the finished product and released to air, land and water ($M_{out} = M_{product} + M_{emitted}$)
$M_{accumulated/depleted}$ = Mass of compound accumulated or depleted in the system

The reliability of release estimates based on mass balances is dependent on the source type considered. Mass balance methods may be preferred for some releases, such as solvent loss from coating applications and solvent use. This method may not be suitable for many other sources, such as cases where chemical transformation of the input streams occurs in the process.

Mass balance methods may or may not account for emission controls, depending on the system, process or operation to which the mass balance is applied. Pollution-control equipment should be accounted for when mass balance calculations are performed.

4.4.5 Site-specific and Published Emission Factors

Emission factors are available for many emission-source categories and are generally based on the results of source-sampling tests performed at one or more facilities within a specific industry. Generally, emission factors relate the quantity of substances emitted from a source to some common activity associated with those emissions. Government agencies and industry associations publish emission factors to be applied to emission sources in their particular jurisdiction or industrial sector. Industrial facilities may also develop their own site-specific emission factors using emission-testing data and source-activity information. For a particular piece of equipment, specified emission factors may be available from the manufacturer or sales centre. When completing the report, you must specify whether a site-specific emission factor or published emission factor was used.

The basic equations for determining emissions from emission factors are as follows:

$$E_x = BQ \times CEF_x \qquad \text{or} \qquad E_x = BQ \times EF_x \times \frac{100 - CE_x}{100}$$

Where:

E_x = Emission of contaminant x in kg
BQ = Activity rate or base quantity (BQ), base quantity unit
CEF_x = Controlled emission factors of contaminant x, kg/BQ unit (value is dependent on the external control device installed)
EF_x = Uncontrolled emission factors of contaminant x, kg/BQ unit
CE_x = Overall emission control efficiency of contaminant x, %

The U.S. EPA Factor Information REtrieval (FIRE) database and *Compilation of Air Pollutant Emission Factors* (*AP-42*) are comprehensive depositories of process-specific emission factors, as already mentioned in Section 4.2.3.

Other emission factors for NPRI substances can be located in the list of Locating and Estimating documents found in the References and Bibliography section of this Guide.

When making use of emission factors, ensure that you note the units and convert if necessary.

4.4.6 Engineering Estimates

General

In many cases, sound engineering assessment is the most appropriate approach to determining process factors and base quantity values. Releases can be estimated from engineering principles and judgment, by using knowledge of the chemical and physical processes involved, the design features of the source and an understanding of the applicable physical and chemical laws. The reliability of these estimates depends on the complexity of the process and the level of understanding of its physical-chemical properties. To apply an engineering assessment method, follow these four basic principles:

- Review all data pertaining to the specific source and to the industrial sector in general.
- Use this data to provide gross approximations and refine these using sound engineering principles as data become available to provide more accurate estimations.
- Whenever possible, alternate methods of calculation should be followed to cross-check each level of approximation.
- Employ good record keeping by documenting all related information for further emission refinement when more accurate data become available.

Emission Models

Emission estimation models, also known as emission estimation tools, are equipment-specific and may be available from process developers and designers, government agencies or others.

Emission models generally require detailed input such as equipment specifications, process and environmental conditions and other factors that affect emissions. Generally, these models also have default input parameters, such as meteorological data, which can be used when site-specific information is not available. Review all the default data carefully to ensure that they apply to local conditions. The resulting estimates should also be reviewed to ensure their accuracy. The U.S. EPA's TANKS software, used to estimate VOC releases from storage tanks, is an example of an emission model.

4.5 Part 1A Substances

If the reporting criteria are met for an NPRI Part 1A substance, then for a given substance, *all* on-site releases, disposals and off-site transfers for recycling must be reported **regardless of the concentration or quantity**. The facility is required to submit a substance report even if on-site releases, disposals or off-site transfers for recycling were zero. You must account for total releases of Part 1A substances from your facility to each environmental medium (air, water and land).

Examples of estimating releases, disposals and transfers for recycling are provided in the *NPRI Toolbox*.

4.6 Part 1B Substances

Part 1B substances include mercury[1], cadmium[1], arsenic[1], hexavalent chromium compounds, lead[2] and tetraethyl lead. If the reporting criteria are met for a Part 1B substance, according to the concentration and mass thresholds outlined in Table 7, then *all* on-site releases, disposals and off-site transfers for recycling of the Part 1B substance must be reported **regardless of the concentration or quantity**.

[1] and its compounds

[2] and its compounds, except tetraethyl lead (CAS No. 78-00-2); does not include lead (and its compounds) contained in stainless steel, brass or bronze alloys

The facility is required to submit a substance report even if releases, disposals or transfers were zero. You must account for total releases of Part 1B substances from your facility to each environmental medium (air, water and land).

Examples of estimating releases, disposals and transfers of some Part 1B substances are provided in the *NPRI Toolbox*.

4.7 Part 2 Substances – Polycyclic Aromatic Hydrocarbons (PAHs)

With the exception of wood preservation facilities that use creosote, if your facility met the 50-kg reporting threshold for the 17 PAHs listed in Table 8, you must report releases, disposals and transfers **individually** for each of the 17 PAHs that were incidentally manufactured and released, disposed of or transferred.

Regardless of the quantity of PAHs released, disposed of or transferred or the number of hours worked by employees, a facility used for wood preservation must submit a report for each/any of the 17 individual PAHs released, disposed of or transferred from a wood preservation process using creosote.

If you do not have information available to estimate releases, disposals and transfers for any of the 17 individual PAHs, the PAH may be reported together under the listing "PAHs, total Part 2." You may report for the 17 individual PAHs, or for "PAHs, total Part 2," **but not for both**. If you report under the listing "PAHs, total Part 2," indicate in the "Comments" field which substances are included in the data, if known.

You must account for total releases of the 17 PAHs from your facility to each environmental medium (air, water and land), as well as for disposals and transfers.

An example of estimating releases and disposals of PAHs is provided in the *NPRI Toolbox*.

4.8 Part 3 Substances – Dioxins/Furans and Hexachlorobenzene (HCB)

A facility that met the criteria set out in Section 3.7 "Reporting Criteria for Part 3 Substances – Dioxins/Furans and Hexachlorobenzene (HCB)" must provide substance reports for dioxins/furans and HCB. The dioxins/furans or HCB substance report submitted to NPRI will indicate:

- the **quantity** released on site, disposed of or transferred off site as the result of incidental manufacture during an activity listed in Tables 5 or 10, and
- that **directly measured releases to a specific medium, disposals or transfers** were at concentrations above, equal to or below the Level of Quantification (LoQ) concentrations set out in Table 17 (this option is available only if estimates were based on Continuous Emission Monitoring Systems [CEMS], Predictive Emission Monitoring [PEM] or source testing), or
- that there were **no releases to a specific medium, no disposals or no transfers**, or
- that **no information** was available on which to base an estimate.

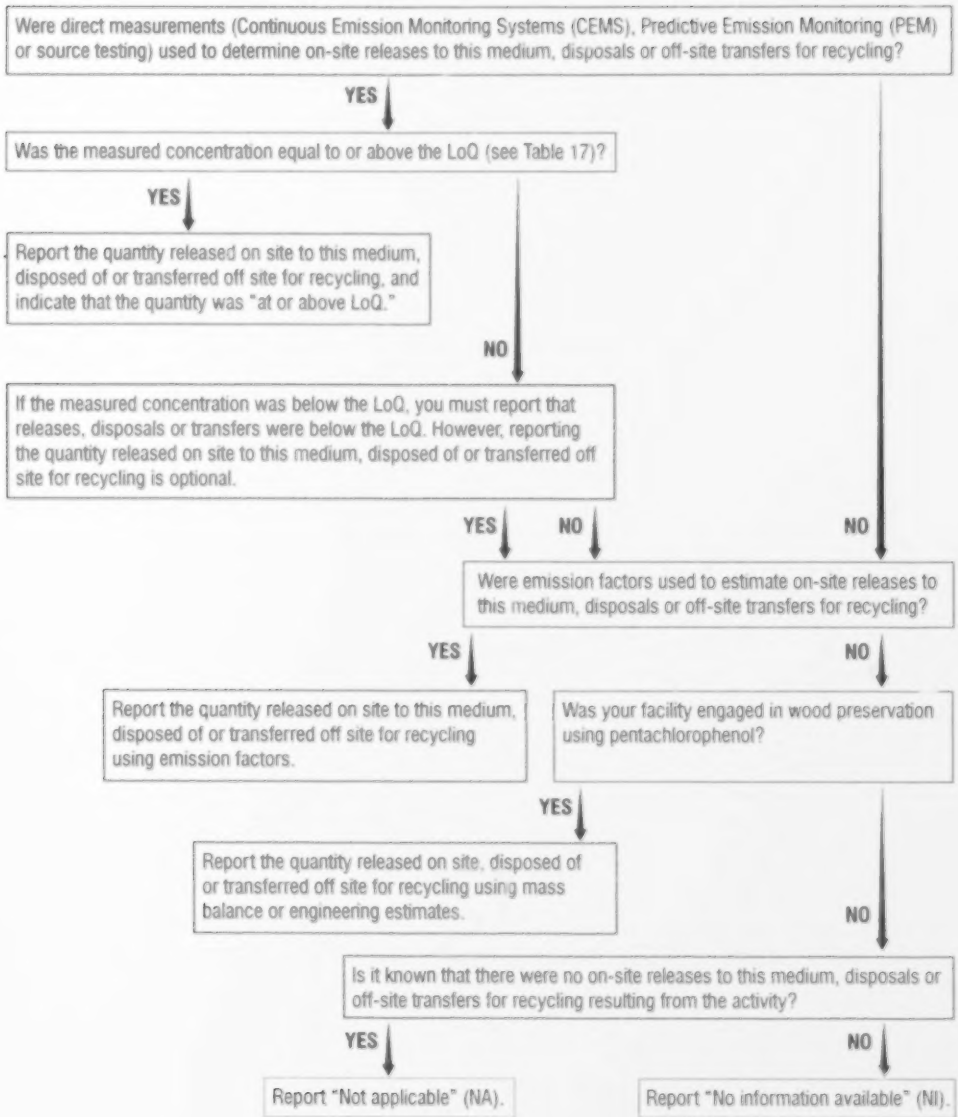
Quantities of dioxins/furans and HCB released on site, disposed of and transferred off site must be reported unless:

- you directly measure dioxins/furans and HCB resulting from incidental manufacture from an activity listed in Tables 5 or 10, and the concentrations were below the LoQ values as defined in Table 17, or
- you have no information available on which to base estimates of on-site releases, disposals and off-site transfers.

Use the flowchart in Figure 9 to determine what you must report to the NPRI for dioxins/furans and HCB. You must report total releases of dioxins/furans and HCB from your facility to each environmental medium (air, water and land), as well as disposals and off-site transfers.

Figure 9:

WHAT YOU MUST REPORT FOR DIOXINS/FURANS AND HCB


Were direct measurements (Continuous Emission Monitoring Systems (CEMS), Predictive Emission Monitoring (PEM) or source testing) used to determine on-site releases to this medium, disposals or off-site transfers for recycling?
YES
Was the measured concentration equal to or above the LoQ (see Table 17)?
YES
Report the quantity released on site to this medium, disposed of or transferred off site for recycling, and indicate that the quantity was "at or above LoQ."
NO
If the measured concentration was below the LoQ, you must report that releases, disposals or transfers were below the LoQ. However, reporting the quantity released on site to this medium, disposed of or transferred off site for recycling is optional.
YES
NO
NO
Were emission factors used to estimate on-site releases to this medium, disposals or off-site transfers for recycling?
YES
NO
Report the quantity released on site to this medium, disposed of or transferred off site for recycling using emission factors.
Was your facility engaged in wood preservation using pentachlorophenol?
YES
Report the quantity released on site, disposed of or transferred off site for recycling using mass balance or engineering estimates.
NO
Is it known that there were no on-site releases to this medium, disposals or off-site transfers for recycling resulting from the activity?
YES
NO
Report "Not applicable" (NA).
Report "No information available" (NI).

4.8.1 What Are Toxic Equivalents (TEQs) of Dioxins/Furans?

You must report releases, disposals and transfers of dioxins/furans in units of grams Toxic Equivalent (TEQ) of the 17 congeners listed in Table 9. Dioxins and furans are often found in complex mixtures, typically at extremely low concentrations, making it difficult to determine the cumulative toxicity of the mixture. Accordingly, scientists have assigned toxic equivalency factors (TEFs) to each dioxin/furan congener as weighting factors. These TEFs are assigned relative to the toxicity of 2,3,7,8-TCDD, the most toxic congener, which is assigned a TEF of one.

To apply and compare TEQs, the values must be calculated using the same set of TEFs. Most of the release data on dioxins/furans currently available in Canada are in units of international toxic equivalents (TEQs) (North Atlantic Treaty Organization/Committee on the Challenges of Modern Society [NATO/CCMS, 1998]). More recent work undertaken for the World Health Organization (van den Berg, 1998) has resulted in a revised set of TEFs, not just for humans, but also for mammals, fish and birds. However, since most of the emission factors currently available are in international TEQs, the TEF values listed in Table 14 must be used for reporting to the NPRI.

To calculate the TEQ of a mixture, you must first multiply the concentration of an individual congener by its respective TEF, or weighting factor, to obtain the congener-specific TEQ concentration. The sum of the TEQ concentrations for the individual congeners is the TEQ concentration for the mixture.

Table 14:

TOXIC EQUIVALENCY FACTOR (TEF) VALUES FOR DIOXINS AND FURANS

CAS Number	Congener	Abbreviation	TEF
	Dioxins		
1746-01-6	2,3,7,8-Tetrachlorodibenzo-*p*-dioxin	2,3,7,8-TCDD	1
40321-76-4	1,2,3,7,8-Pentachlorodibenzo-*p*-dioxin	1,2,3,7,8-PeCDD	0.5
39227-28-6	1,2,3,4,7,8-Hexachlorodibenzo-*p*-dioxin	1,2,3,4,7,8-HxCDD	0.1
57653-85-7	1,2,3,6,7,8-Hexachlorodibenzo-*p*-dioxin	1,2,3,6,7,8-HxCDD	0.1
19408-74-3	1,2,3,7,8,9-Hexachlorodibenzo-*p*-dioxin	1,2,3,7,8,9-HxCDD	0.1
35822-46-9	1,2,3,4,6,7,8-Heptachlorodibenzo-*p*-dioxin	1,2,3,4,6,7,8-HpCDD	0.01
3268-87-9	Octachlorodibenzo-*p*-dioxin	OCDD	0.001
	Furans		
51207-31-9	2,3,7,8-Tetrachlorodibenzofuran	2,3,7,8-TCDF	0.1
57117-31-4	2,3,4,7,8-Pentachlorodibenzofuran	2,3,4,7,8-PeCDF	0.5
57117-41-6	1,2,3,7,8-Pentachlorodibenzofuran	1,2,3,7,8-PeCDF	0.05
70648-26-9	1,2,3,4,7,8-Hexachlorodibenzofuran	1,2,3,4,7,8-HxCDF	0.1
72918-21-9	1,2,3,7,8,9-Hexachlorodibenzofuran	1,2,3,7,8,9-HxCDF	0.1
57117-44-9	1,2,3,6,7,8-Hexachlorodibenzofuran	1,2,3,6,7,8-HxCDF	0.1
60851-34-5	2,3,4,6,7,8-Hexachlorodibenzofuran	2,3,4,6,7,8-HxCDF	0.1
67562-39-4	1,2,3,4,6,7,8-Heptachlorodibenzofuran	1,2,3,4,6,7,8-HpCDF	0.01
55673-89-7	1,2,3,4,7,8,9-Heptachlorodibenzofuran	1,2,3,4,7,8,9-HpCDF	0.01
39001-02-0	Octachlorodibenzofuran	OCDF	0.001

(Source: NATO/CCMS, 1998)

Example

The following table shows the different concentrations of four dioxin and furan congeners in an ash sample. If these concentrations were simply summed together, the sample would be reported as containing 80 ng of dioxins/furans in each kg of ash. However, 1,2,3,4,7,8-HxCDF is 10 times less toxic than 2,3,7,8-TCDD. By applying the TEFs to each congener and summing the values, the resulting toxic equivalent (TEQ) for the mixture is 25 ng TEQ of dioxins/furans in each kg of ash, or 25 ng TEQ/kg.

Table 15:

EXAMPLE OF A TEQ CALCULATION

Dioxin/Furan Congener	Sample Concentration (ng/kg)	Toxic Equivalency Factor (TEF)	Toxic Equivalent (ng TEQ/kg ash)
2,3,7,8-TCDD	10	1	10
1,2,3,7,8-PeCDD	20	0.5	10
1,2,3,4,7,8-HxCDF	30	0.1	3
1,2,3,6,7,8-HxCDF	20	0.1	2
Total Concentration			**25 ng TEQ/kg**

4.8.2 Methods of Estimation

When you report on-site releases to each environmental medium, disposals and off-site transfers for dioxins and furans and HCB, you will select one of the following seven methods of estimation in the NPRI reporting software:

- Continuous Emission Monitoring Systems (CEMS),
- Predictive Emission Monitoring (PEM),
- source testing,
- mass balance,
- site-specific emission factor,
- published emission factor, or
- engineering estimates.

In addition to the methods above, two other options exist:

- no information available (NI), or
- not applicable (NA).

These codes as they relate to dioxin/furan and HCB reporting are further explained below. Table 16 indicates whether or not the quantities of these substances need to be reported based on the method of estimation in combination with the LoQ.

Table 16:

HOW TO REPORT RELEASES, DISPOSALS AND TRANSFERS OF DIOXINS/FURANS AND HCB

Method of Estimation	Comparison to LoQ	Report Quantity?
Continuous Emission Monitoring Systems (CEMS), Predictive Emission Monitoring (PEM) or source testing	at or above LoQ	yes
Continuous Emission Monitoring Systems (CEMS), Predictive Emission Monitoring (PEM) or source testing	below LoQ	optional
Mass balance	n/a	yes
Site-specific emission factor or published emission factor	n/a	yes
Engineering estimate	n/a	yes
No information available (NI)	n/a	n/a
Not applicable (NA)	n/a	n/a

Direct Measurements

Direct measurements include CEMS, PEM and source testing. A direct measurement is based on measured concentrations of the substance in a waste stream and the volume/flow rate of that stream. Direct measurements should be made of on-site releases, disposals and off-site transfers for recycling that are representative of the facility's normal operating conditions or production levels.

If your facility has made direct measurements of dioxins/furans or HCB, these data should be used to determine which releases, disposals and transfers, if any, must be reported to NPRI. Enter the appropriate method of estimation in the NPRI reporting software. As shown in Table 16, when direct measurements have been made, the quantities of dioxins/furans and HCB released to the environment need to be reported only if the measurements were at or above the LoQ. There is a field in the reporting software to indicate whether your measured concentrations were above, equal to or below the LoQ. Examples of how to estimate releases using measured data are provided in the *NPRI Toolbox*.

The following sections will help you determine if your measured concentrations were above, equal to or below the LoQ for each type of material that you released on site, disposed of and transferred off site for recycling.

Level of Quantification (LoQ)

The level of quantification (LoQ) is defined in section 65.1 of the *Canadian Environmental Protection Act 1999* (CEPA 1999), as "the lowest concentration that can be accurately measured using sensitive but routine sampling and analytical methods." Environment Canada determines LoQ values by carrying out statistical analyses of several sets of measurements from a variety of emission sources. The LoQ is calculated as 10 times the standard deviation of replicated measurements (ASTM, 2002). The standard deviation is the variability of the test data associated with the sampling, analysis and actual source emission changes during testing, using standard test methods.

Table 17 provides estimated LoQs for dioxins/furans and HCB for three types of material or waste streams that may be released, disposed of or transferred – gaseous, liquid and solid. The LoQ values listed include both final and draft values published by Environment Canada. You must compare your measured concentrations to the appropriate LoQ for each type of on-site release, disposal and off-site transfer that you report to the NPRI. Containment in an off-site landfill is an example of a type of disposal. Recovery of pollution-abatement residues is an example of an off-site transfer for recycling.

Environment Canada has published estimated LoQ values for dioxin/furan and HCB concentrations in gaseous releases (Environment Canada, 1999). You should use these values to determine whether concentrations in releases to air from stacks and other sources were above, equal to or below the LoQ.

Table 17:

ESTIMATED LoQ VALUES FOR CONCENTRATIONS OF DIOXINS/FURANS AND HCB

State of Material	Estimated LoQ for Concentrations of Dioxins/Furans	Estimated LoQ for Concentrations of HCB
Gaseous	32 pg TEQ/m^3	6 ng/m^3
Liquid	20 pg TEQ/L	70 ng/L
Solid	9 pg TEQ/g	2 ng/g

While Environment Canada has not published an LoQ for dioxin/furan concentrations in liquids, it has extrapolated a draft LoQ for dioxins/furans in liquids from the effective LoQ for 2,3,7,8-TCDD in *Pulp and Paper Mill Effluent Chlorinated Dioxins and Furans Regulations*. Facilities should use 20 pg TEQ/L as the LoQ for concentrations of dioxins/furans in liquids.

Environment Canada has developed an estimated LoQ for concentrations of HCB in chlorinated solvents (Environment Canada, 1997). Facilities should use 70 ng/L as the estimated LoQ for concentrations of HCB in all liquids.

Environment Canada published proposed LoQ values for dioxins/furans and HCB in soil in early 2000 (Environment Canada, 2000). You should use LoQ values of 9 pg TEQ/g for dioxins/furans and 2 ng/g for HCB to determine whether concentrations of dioxins/furans or HCB in solid materials were equal to or above the LoQ. Incinerator bottom ash, pollution-abatement residues and sludges are examples of solid materials containing dioxins/furans or HCB that may be released on site, disposed of or transferred off site.

Were Your Measured Concentrations Equal to or Above LoQ?

When comparing measured concentrations to LoQ values, measurements should be made of on-site releases, disposals and off-site transfers for recycling representative of your facility's normal operating conditions or production levels. If you determine that your measured concentrations were equal to or above the LoQ, you must estimate and report the quantities of releases, disposals and off-site transfers for the 2004 calendar year using these concentrations. Indicate in the NPRI reporting software that concentrations were at or above LoQ.

Were Your Measured Concentrations Below LoQ?

When comparing measured concentrations to LoQ values, measurements representative of your facility's normal operating conditions or production levels should be made. If you directly measured dioxins/furans and HCB in a release, disposal or off-site transfer resulting from incidental manufacture during an activity listed in Tables 5 or 10, and the concentrations were below LoQ, reporting the quantities released, disposed of and transferred is optional. Indicate in the NPRI reporting software that concentrations were below LoQ.

Example
A facility has directly measured dioxins/furans resulting from incineration of non-hazardous solid waste (incidental manufacture of dioxins/furans during an activity listed in Table 5). The facility determined that dioxins/furans were released to air from a stack at a concentration of 20 pg TEQ/m^3. The measured concentration was below the LoQ of 32 pg TEQ/m^3 so the facility does not need to report the quantities of dioxins/furans released on site from stacks. The facility will report that releases to air of dioxins/furans from the stack were below LoQ.

Dealing with Multiple Data Points and Non-detected Values

If you have several sets of directly measured concentrations for a given release, disposal or transfer, you should compare the average or mean value of all the concentrations with the appropriate LoQ (see Section 4.3, "Method Detection Limit," for more guidance on how to calculate a mean concentration when you have multiple data points and non-detected values). Once you have calculated the mean concentration of all the measured values, use this concentration to calculate the quantities of dioxins/furans and HCB released on site, disposed of or transferred off site.

Emission Factors

An emission factor is based on average measured emissions from several similar processes. Emission factors usually express releases as a ratio of quantity released to process or equipment throughput. In the absence of data from direct measurements, your facility should estimate releases, disposals or transfers of dioxins/furans or HCB as a result of incidental manufacture, using emission factors that you possess or to which you have reasonable access.

Emission factors may be developed for one or more facilities using measured data under similar process conditions. Many emission factors for activities listed in Tables 5 and 10 are compiled in the FIRE database (refer to the *NPRI Toolbox*.) In the "Comments" field of the NPRI reporting software, you should indicate the source of any emission factor used. If an emission factor for your activity is available in the FIRE database or another reputable source, but is not applicable to your process or equipment, you must provide your reason in the "Comments" field.

If you use emission factors to estimate releases, disposals and transfers, you must report these amounts. You cannot report that your concentrations for a specific on-site release, disposal or off-site transfer were below the LoQ.

No Information Available

If information is not available for releases to a specific medium, for a disposal or for a transfer for recycling, either through direct measurements, emission factors or some other source to which the facility possesses or may reasonably be expected to have access, then the facility should report "No information available" for on-site releases to that medium, for disposals or for off-site transfers for recycling. If you report "No information available" for an activity for which an emission factor is available, you must provide your reason for not using the emission factor in the "Comments" field of the NPRI reporting software.

No On-site Releases (to a Specific Medium), Disposals or Transfers

If there were no dioxin/furan or HCB releases to a given medium, the facility should leave the default code "Not applicable" in the reporting software for that particular medium. Similarly, if the facility did not dispose or transfer any of these substances, they would report "Not applicable" in the software for the disposal and transfer categories.

For example, if dioxins/furans were only released to air from a combustion process of an activity listed in Tables 5 or 10, and there was no related process with releases to water as a result of that activity, the facility reports "Not applicable" for on-site releases of dioxins/furans to water.

4.9 Part 4 Substances – Criteria Air Contaminants (CACs)

If the reporting criteria are met for an NPRI Part 4 substance, the air releases of that substance must be reported.

A facility may be required to break down its releases for each stack greater than or equal to 50 metres above grade **if the stack-specific quantitative threshold is met**. For example, if a facility meets the reporting criteria for NO_x (20 tonnes) by emitting 25 tonnes and has a stack greater than 50 metres above grade that emitted 7 tonnes of NO_x:

- 25 tonnes of NO_x must be first reported for total NO_x releases;
- 7 tonnes of NO_x must be reported under the stacks greater than 50 metres above grade requirements because it exceeded the stack-specific threshold for NO_x (5 tonnes).

The stack-specific thresholds are provided in Table 18 for all CACs.

The rationale for stack-by-stack breakdown of CAC emissions is outlined in Appendix 7 – Data Requirements for Regional Air Quality Modelling.

Table 18:

STACK-SPECIFIC REPORTING THRESHOLDS FOR STACKS ≥ 50 M ABOVE GRADE

Substance Name	Stack Reporting Threshold
Nitrogen oxides, NO_x (expressed as NO_2)	5 tonnes
Sulphur dioxide, SO_2	5 tonnes
Carbon monoxide, CO	5 tonnes
Volatile organic compounds, VOCs	5 tonnes
Total particulate matter, TPM	5 tonnes
Particulate matter ≤ 10 microns, PM_{10}	0.25 tonnes
Particulate matter ≤ 2.5 microns, $PM_{2.5}$	0.15 tonnes

4.10 Part 5 Substances – Speciated Volatile Organic Compounds (VOCs)

Reporting for Part 5 substances needs to be considered only if the facility met the Part 4 total volatile organic compound (VOC) reporting requirements. Reporting is required if the Part 5 substances were emitted to air in a quantity greater than or equal to 1.0 tonne. Speciated VOC substances not on the Part 5 substance list may also be reported in a comment field available in the NPRI software.

4.10.1 Stack-specific Speciated VOC Reporting

Reporting on a stack-by-stack basis for stacks greater than or equal to 50 metres above grade is only required if stack-by-stack reporting is required in Part 4 (i.e. total VOCs ≥ 10 tonnes and stacks ≥ 50 metres above grade with ≥ 5 tonnes VOCs emissions). In this case, Part 5 substance reporting is subdivided into two categories: Releases from stacks greater than 50 metres above grade and releases from all other sources. Figure 10 outlines the reporting process. An example follows to illustrate this principle.

Example
A facility emits 28 tonnes of VOC to air, 7 tonnes of which are emitted from a 65-metre stack. The remaining 21 tonnes are from storage/handling, fugitive releases, spills and other non-point sources.

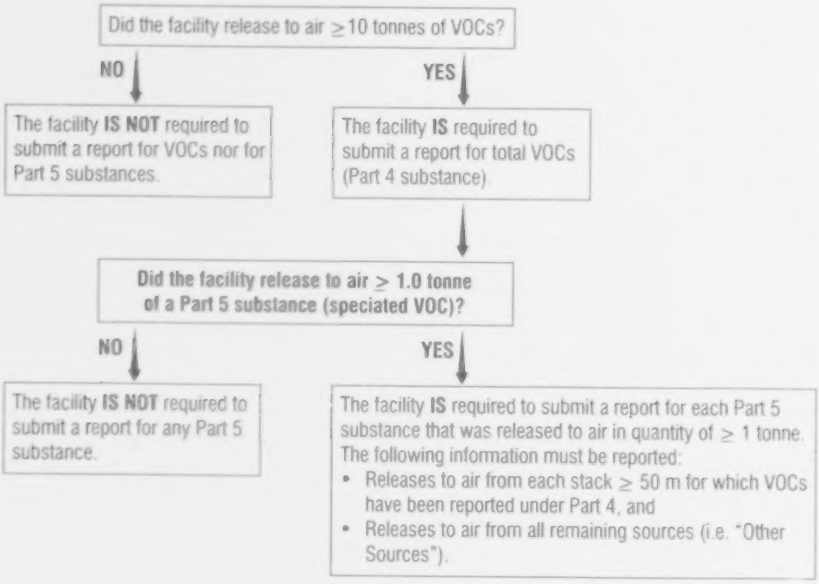
Three tonnes of styrene are released to air, 0.4 tonnes of which are from the 65-metre stack.

The reporting requirements are as follows:

- The reporting threshold for total VOCs (Part 4 substances) is 10 tonnes released to air. Since the facility released 28 tonnes of VOC to air, it exceeds the threshold and is required to submit a report for VOCs under Part 4.
- When reporting total VOCs, the facility is required to provide VOC emissions from stacks with a height ≥ 50 metres above grade that release ≥ 5 tonnes of VOCs. This facility has a stack that is 65 metres tall which released 7 tonnes of VOCs. As such, the stack-specific threshold has been met and the 7 tonnes of VOCs released must be included under the facility's stack reporting.
- Styrene is a Part 5 substance (speciated VOC). The styrene release of 3 tonnes exceeds the 1-tonne release threshold for a Part 5 substance. Since the total VOCs and stack-specific mass thresholds have been met, the information must be reported as follows: 0.4 tonnes released from the 65-metre stack, and 2.6 tonnes released from "Other Sources."

Figure 10:

WHAT YOU MUST REPORT FOR PART 5 SUBSTANCES


Did the facility release to air ≥ 10 tonnes of VOCs?
NO
YES
The facility IS NOT required to submit a report for VOCs nor for Part 5 substances.
The facility IS required to submit a report for total VOCs (Part 4 substance).
Did the facility release to air ≥ 1.0 tonne of a Part 5 substance (speciated VOC)?
NO
YES
The facility IS NOT required to submit a report for any Part 5 substance.
The facility IS required to submit a report for each Part 5 substance that was released to air in quantity of ≥ 1 tonne. The following information must be reported:
• Releases to air from each stack ≥ 50 m for which VOCs have been reported under Part 4, and
• Releases to air from all remaining sources (i.e. "Other Sources").

4.10.2 Isomer Groups

Isomer groups listed in Part 5 must be reported as an aggregated total. There are only two instances where a specific isomer is listed separately from the listing for the isomer group:

- The listing for "Hexane" includes all isomers of hexane, except for "n-Hexane" since it is listed separately in the first subgroup, "individual substances," of the Part 5 list.
- The listing for "Trimethylbenzene" includes all isomers of trimethylbenzene, except for "1,2,4-Trimethylbenzene" since it is listed separately in the first subgroup, "individual substances," of the Part 5 list.

The *NPRI Toolbox* contains a list of substances and CAS numbers included in the listings for each of the Part 5 isomer groups.

4.10.3 Other Groups and Mixtures

With respect to "other groups and mixtures," facilities must report emissions for the mixtures listed on the Part 5 substance list. While not required, if information is available on other individual VOCs contained in a mixture or group (and not listed in Part 5), this information may be provided in the Comments field for Part 5 Substances.

5. What Must Be Reported

In general, NPRI reporting is divided into two categories: Facility-related information and substance-related information. The information reported must be based on the best available data and information in your possession or to which you have reasonable access.

5.1 Facility Information

The facility information required includes the company's legal name and address, its business number, the number of its employees, the nature of the facility's business and contact information including the technical contact and the company official certifying the NPRI report. In addition, any facility that is reporting for a CAC must provide the facility's operating schedule. Finally, the facility screens of the NPRI reporting software provide an opportunity for facilities to identify any pollution-prevention plans they implemented or prepared in 2004. More information on the facility-related screens in the reporting software is available in the NPRI Software Guide.

Business Number

You now must report the company's business number. Business numbers (BNs) can be found on all forms issued to a business by the Canada Customs and Revenue Agency. The first nine digits are the registration number and must be reported to the NPRI. This registration number remains the same no matter how many or what types of accounts a business may have. BNs are issued to Canadian businesses that register for one or more of the following accounts – Corporate Income Tax, Importer/Exporter account number, Payroll (source) deductions (trust accounts) and Goods and Services Tax.

5.2 Substance Information

The substance information required for the majority of NPRI substances includes the name of the substance, its CAS number, the nature of its use, the quantities released on site to various media, the quarterly breakdown of on-site releases, disposal quantities, the quantities transferred off site for recycling, the anticipated releases, disposals and transfers for recycling over the next three years and any pollution-prevention activities implemented by the facility.

In contrast to the requirements for Parts 1A through 3 substances, only on-site releases to air need be reported for Parts 4 and 5 substances. In addition, CAC (Part 4) releases must be broken down on a monthly basis and, provided the relevant criteria are met, on a stack-by-stack basis. For stacks meeting the relevant criteria greater than or equal to 50 metres above grade, a number of stack parameters must be reported including the stack height and diameter and the exit velocity and exit temperatures of the stack gases. Part 5 substances emitted in a quantity greater than or equal to 1.0 tonne must also be reported provided the VOC threshold is met. More information on the substance-related screens in the reporting software is provided in the *NPRI Software Guide.*

Releases, Disposals and Transfers as Defined by NPRI

While the *NPRI Software Guide* goes into greater detail describing the various categories to which NPRI substances are reported, the following information about NPRI reporting categories is provided to give users a general understanding of what constitutes an on-site release, disposal or off-site transfer in the context of NPRI reporting. Four categories are described below – on-site releases, on-site and off-site disposals, off-site transfers for treatment prior to final disposal and off-site transfers for recycling.

On-site Releases:
An on-site release is a discharge of an NPRI-listed pollutant to the environment within the physical boundaries of the facility. This includes:

- emissions to air – discharges through a stack, vent or other point of release, losses from storage and handling of materials, fugitive emissions, spills and accidental releases and other non-point releases,
- releases to surface waters – discharges, spills and leaks, but not including discharges to municipal wastewater treatments plants (which are reported under off-site transfers for treatment), and
- releases to land – spills, leaks and other.

Final Disposal Activities (On-site and Off-site):
The following activities or operations are included in the category classified as "final disposal":

- landfill,
- land treatment – for the purpose of land application or land farming,
- underground injection, and
- storage (for off-site disposal only).

Off-site Transfers for Treatment Prior to Final Disposal:
A shipment of an NPRI-listed substance may be transferred to an off-site location for treatment prior to final disposal. The treatment processes include:

- physical treatment (e.g., drying, evaporation, encapsulation or vitrification),
- chemical treatment (e.g., precipitation, stabilization or neutralization),
- biological treatment (e.g., bio-oxidation),
- incineration or thermal treatment where energy is not recovered, and
- treatment at a municipal sewage treatment plant.

Off-site Transfers for Recycling and Energy Recovery:
A shipment of an NPRI-listed substance may be transferred to an off-site location for recycling and energy recovery. *Recycling* refers to activities that keep a material or a component of the material from becoming a waste destined for final disposal. Ten types of recycling operations are identified:

- recovery of solvents,
- recovery of organic substances (other than solvents),
- recovery of metals and metal compounds,
- recovery of inorganic materials (other than metals),
- recovery of acids and bases,
- recovery of catalysts,
- recovery of pollution abatement residues,
- refining or reuse of used oil,
- other recovery, reuse or recycling activities, and
- energy recovery.

An NPRI substance may be sent for energy recovery when the substance or the material containing it has sufficient energy content (BTU) to allow its use as an alternative to fossil fuels or other forms of energy.

5.3 Retain a Copy of the Information on Which Your NPRI Report was Based

This is a legal requirement, pursuant to subsection 46(8) of the *Canadian Environmental Protection Act 1999* (CEPA 1999), and the *Canada Gazette* notice. The owner or operator of a facility is required to keep copies of the required information, together with any calculations, measurements and other data on which the information reported was based. This information must be kept at the facility to which it relates or at the facility's parent company for a period of three years.

5.4 Request for Confidentiality

Reporting to NPRI for 2004 is governed by the requirements of the CEPA 1999, as well as the *Canada Gazette* notice, published January 17, 2004.

Pursuant to sections 51 and 313 of the CEPA 1999, any person who provides information in response to the 2004 *Canada Gazette* notice may submit a written request that it be treated as confidential, based on the reasons set out in section 52 of the CEPA 1999. For each facility and each substance reported, the request for confidentiality must clearly indicate each field for which a request is being made. **The written request must accompany the report.**

For a report to be treated as confidential, the company must demonstrate that it treats the information as confidential and wishes to continue to do so. It must also demonstrate that this information is not available to the general public through legal means, such as obtaining a public copy of a provincial waste permit.

A request for confidentiality is not determinative. A determination of whether the information is confidential will be based on an objective analysis of the facts.

It is recommended that you include with your request for confidential treatment, documentation that would justify that the information submitted should be confidential as per the criteria outlined in section 52 of the CEPA 1999.

If documentation is not provided with the claim, or the if the documentation provided does not support the claim, the Minister may follow the procedures with respect to publication of the information set out in section 53 of the CEPA 1999. Notwithstanding the above, the Minister may, in the appropriate circumstances, contact the person to inform them that the information may be disclosed as permitted under sections 315 through 317 of the CEPA 1999.

A request for confidentiality will be denied if the data are already in the public domain.

Necessary precautions should be taken when submitting an NPRI report for which a request for confidentiality is being made. This includes, but is not limited to, the following:

- Confidential materials are to be sent in double envelopes, excluding the courier outer envelope
- The outside envelope should be unmarked except for mailing and return addresses and postage.
- The inside envelope should be stamped on both sides with wording such as "Contains Confidential Information."

Should you have any questions concerning confidentiality requests, contact your regional NPRI office, which is listed on the inside front cover of this Guide.

5.4.1 Section 52 of the CEPA 1999

With regard to information submitted to NPRI, section 51 of the CEPA 1999 allows any person to submit a written request with the information, setting out the reason(s) referred to in section 52 (see below), that the information should be treated as confidential.

Section 52 of the CEPA 1999, provides that:

> **52.** Despite Part 11, a request under section 51 may only be based on any of the following reasons:
>
> (*a*) the information constitutes a trade secret;
> (*b*) the disclosure of the information would likely cause material financial loss to, or prejudice to the competitive position of, the person providing the information or on whose behalf it is provided; and
> (*c*) the disclosure of the information would likely interfere with contractual or other negotiations being conducted by the person providing the information or on whose behalf it is provided.

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Questions and Answers

1. ***Is a facility meeting the criteria described in the* Canada Gazette *notice required to report if there were no releases of NPRI substances during the calendar year?***
   Yes. The reporting requirements vary by substance. The criteria for most substances are based only on quantity manufactured, processed or otherwise used, number of employees and concentration of NPRI substances. The reporting criteria for polycyclic aromatic hydrocarbons (PAHs), dioxins/furans, hexachlorobenzene (HCB) and criteria air contaminants (CACs) are all different and may be activity- or release-based. Once you meet the substance-specific reporting criteria, you must report regardless of the amounts released, disposed of or transferred, even if the amount is zero.

2. ***Our facility closed part way through the calendar year. Are we required to submit an NPRI report?***
   Yes. If your facility met the reporting criteria and was in operation during any portion of the calendar year, you are required to report.

3. ***In British Columbia, several fish processors have factories on ships. These factories use ammonia and chlorine in their fish processing operations. Is each ship considered a "facility" under the* Canada Gazette *notice, or is the whole group of ships (assuming they are owned by one company) a facility?***
   Under NPRI, a facility can be a contiguous facility, a pipeline installation or an offshore installation (see Section 3.2 "Facility Criteria" for the definitions of these facility types). A ship is not a contiguous facility as defined under the notice, because it is not stationary nor is it located on a single site. Further, a ship cannot be classified as a pipeline installation. The definition of offshore installation does include ships only if the ship is directly related to the exploitation of oil and gas. Since the ships in question are in the fish industry, they are not offshore installations. Therefore, there is no requirement to report since none of the facility definitions apply to the ships in question.

4. ***A barge-repair facility cleans barges by vacuuming out residual products containing listed substances and recycling them. Must the facility report?***
   The facility is processing the chemicals. Therefore, if the threshold criteria for reporting are met, the facility must submit a report. Releases during vacuuming must be reported, as well as releases from related activities such as spills and equipment cleaning.

   Routine cleaning of the exterior of the barge is considered maintenance of a transportation vehicle and is therefore exempt, except painting and stripping the barge.

5. ***Does the determination of a full-time employee "equivalent" include the hours worked by sales staff whose offices are located in the same building as the production staff, or who work outside the facility?***
   Yes. All staff employed at a facility, regardless of function or location, count toward the employee threshold determination.

   This includes persons employed at the facility, owners who performed work on site at the facility, clerical staff, sales staff and persons such as contractors who performed on-site work related to the normal operation of the facility on a routine basis.

6. ***Would a facility with nine full-time employees and four part-time employees be required to report to NPRI?***
   Total the hours worked by all people, including contractors who are performing work related to the operations of the facility. If the total is 20 000 hours or more per year, the criterion for the number of full-time employees has been met and all NPRI substances must be considered.

However, if the facility was used for incineration, wood preservation, terminal operations or wastewater collection systems discharging 10 000 m^3 or more per day into surface waters, all NPRI substances must be considered, regardless of the hours worked by employees.

Furthermore, if the total employee-hours are less than 20 000, only CACs from stationary combustion equipment must be considered. However, it is possible for a facility with less than 20 000 employee hours to be exempt from reporting to NPRI for CACs if **all three** of the following criteria are met:

- the only releases to air occurred from stationary external combustion equipment, **and**
- it had a cumulative nameplate capacity of less than 10 million BTU/hour for all sources, **and**
- the only fuel combusted in the equipment was commercial grade natural gas, liquefied petroleum gas, or No. 1 or 2 fuel oil, or any combination thereof.

7. ***When calculating the total number of hours worked by all employees during the calendar year, should overtime, vacation and sick leave be included in the 20 000-hour threshold?***
Yes. The facility must consider all overtime, paid vacation and sick leave in the 20 000-hour threshold. An employee includes a person employed at the facility, an owner who performed work on site at the facility and a person who performed work on site at the facility on a routine basis that is related to the normal operations of the facility, for the period of time the person performed that work, such as contractors.

8. ***When should an individual's time spent working at a facility be counted for purposes of determining whether or not a facility meets or exceeds the 20 000-hour threshold?***
If an individual is employed by the facility or by the facility's parent company to work at the facility, then all of the hours worked by the individual must be counted toward the 20 000-hour threshold. Contractors performing work related to the operations of the facility must also be included. If an individual both owns and works for the facility, their hours must be applied to the 20 000-hour threshold.

9. ***Who is required to submit the NPRI report for a given calendar year if the facility has changed ownership during that year?***
The owner or operator of the facility as of December 31 of the calendar year is responsible for submitting the report for that year if the facility met the criteria for reporting. Transfers of ownership must ensure that information for NPRI reporting for the entire calendar year is available.

10. ***Is the owner or the operator responsible for reporting?***
The *Canada Gazette* notice requires a person who owns or operates a facility to report information to which the person has access or can reasonably be expected to have access. This is usually the operator; however, both the owner and the operator are subject to the notice. If no report is received from a facility that met the reporting requirements, both persons may be held liable.

11. ***Who is considered a "parent company"?***
The "parent company" means the highest level company or group of companies that own or directly control the reporting facility. The parent companies of interest to NPRI are those Canadian companies that have greater than 10% ownership in the company. For example, CNS Corporation has five owners, but one of the owners is American and the other four are Canadian. In this case, only the Canadian companies would be shown as parent companies, provided they each owned more than 10% of CNS Corporation.

12. ***A company had been operating its manufacturing processes in a leased warehouse. In July, it bought its own warehouse and moved the manufacturing operations. These two sites are neither adjacent nor contiguous. The company did not shut down or close during this time. How should the company make threshold determinations and report to NPRI?***
When determining thresholds and reporting, the company must consider two separate facilities because the operations were carried out at two distinctly separate physical sites. Threshold determinations must be made for the period of time during which each facility operated. A new NPRI ID number will be assigned to the new facility.

13. ***Acme Plastics is a wholly owned subsidiary of a major chemical company, which is a wholly owned subsidiary of XYZ Oil Corporation. Which is the parent company?***
XYZ Oil Corporation is the parent company because it is the highest-level company that directly controls Acme Plastics.

14. ***We lease land adjacent to our existing facility, which is separated from it by a public railway. Do we need to include the operations on this leased land in our threshold calculations for the existing facility?***
Two sites owned or operated by the same company that function as a single integrated site, but are separated by a railway, would be considered adjacent sites since they are physically adjacent to one another except for a public right-of-way. Therefore, reporting thresholds would be determined by the combined quantities of substances manufactured, processed or otherwise used at both sites. The 20 000-hour threshold would be determined by the sum of hours worked at both sites.

15. ***A Vancouver-based company has a plant in Alberta which processes 12 tonnes of methanol, a plant in Ontario which processes 8 tonnes of methanol, and a plant in Quebec which processes 11 tonnes of methanol. Do the three plants have to report as a company or can they report as separate facilities?***
A report is required for each facility that met the reporting criteria; their activities cannot be combined. In this case, the plant in Ontario is not required to submit a report for methanol, but the other two are since they met the 10-tonne threshold. The company may choose to report for each of the facilities meeting the reporting criteria in one coordinated report, or to have each facility submit its report separately.

    In addition, since methanol is a VOC, each facility must include any methanol released to air in the calculation of its facility-wide total VOC air emissions reported under Part 4. If the facility-wide total VOC release is greater than or equal to 10 tonnes, the facility would also be required to report the amount of methanol released to air (if greater than 1.0 tonne) under Part 5 of NPRI.

16. ***When contractors working at a facility supply their own materials and supplies, such as solvents containing NPRI substances, should these substances be included in the threshold determination and reported by the facility?***
Yes. The owner or operator of the facility must include in their threshold calculations the quantities of NPRI substances manufactured, processed or otherwise used or released to the atmosphere by contractors if those activities are relevant to the purpose of the facility.

17. ***An NPRI substance is the working fluid in our heat-transfer equipment. Must the quantity of the NPRI substance be accounted for in determining the reporting threshold?***
Yes. Heat-transfer equipment is not considered a manufactured article, since under normal operating conditions NPRI substances can be released. Therefore, the fluid within the heat-transfer equipment is considered to be an "other use" of the NPRI substance, relevant to the purposes of the facility as defined in the *Canada Gazette* notice. All NPRI substances in the heat-transfer equipment must be included in the threshold calculation. If additional fluid is used in refilling the process equipment it must also be included in the threshold calculation.

18. ***Our company disposes of some of its waste in a landfill site, which belongs to the company but is in a different location. Is this an on-site or off-site disposal?***
This would be considered an off-site disposal, because the landfill is not adjacent to or contiguous with the facility.

19. ***Our company sorts scrap metal and compresses it into bales to be sold to secondary metal producers. Most of the metal we recover contains some NPRI substances (Zn, Cr excluding hexavalent chromium) in excess of 1% concentration. The process does not release any NPRI substances; it only compresses the pieces into bales. Are we required to submit a report?***
No. In this case, the items being handled would retain their status as articles as long as there are no on-site releases to the environment or any disposals.

20. ***At what point in the processing of ore must mining companies report?***
The exemption for mining is for activities related to the actual removal of ore, rock or overburden, up to and including primary crushing. The mining exemption, however, does not apply to Part 4 substances (CACs) or the Part 5 speciated VOCs released from stationary combustion equipment. In this case, the mining operation must report any CAC and speciated VOC releases from its combustion equipment that met the CAC and speciated VOC release thresholds. The exemption for CAC reporting explained in Question 6 may be valid if the only activities occurring at the mine were up to and including primary crushing.

    Any NPRI substances manufactured, processed or otherwise used or released to the atmosphere in the further processing of the rock or ore, such as milling, concentrating, smelting and refining, would be reportable if the thresholds were met.

    This would include, but not be limited to, NPRI substances found in the processed ore, solvents, acids, flotation agents, flocculation agents, dust suppressants, fuels used in power generation, particulate matter and combustion contaminants (e.g., NO_x, SO_2). Listed substances in tailings are not reported unless they left the tailings impoundment or other forms of on-site containment.

21. ***If a substance is spilled one year, and will result in air emissions over time in the following year, how should it be reported?***
The portion of the spill not cleaned up must be reported as a release the year it occurred. It must be reported as a release to the environmental media affected (air, water, land). Further migration between media does not need to be reported.

    For example, if 100L of an NPRI substance is spilled and 80L is recovered, a release of 20L must be reported. If the 80L is returned to the process, no further action is required. However, if it is sent off site for treatment or disposal, it must be reported accordingly.

22. ***Can a facility use its own software to report electronically to NPRI?***
Environment Canada supplies the software required for reporting and strongly recommends that this be used to submit an NPRI report.

    If you choose to use other software and the report submitted cannot be read and verified by Environment Canada's own reporting software, the report will be considered incomplete and will be returned for correction. Environment Canada reserves the right to change its software and file structure at any time.

23. ***We use a 50% methanol solution in one part of the plant. The annual consumption of methanol exceeds 10 tonnes. In another part of the plant, a completely separate process produces a few tonnes of methanol, which are released through a stack. Do we have to estimate methanol releases from the stack even if they are from a different process?***
Yes. Because your facility uses more than 10 tonnes of methanol, it is required under Part 1A substance requirements to report all its releases, disposals and transfers off-site of methanol, regardless of the process stream. Since methanol is a volatile organic compound (VOC), the amount of methanol released to air must also be included in your facility-wide total VOC emissions. As per Part 4 substance requirements, a report is needed for the total VOC air emissions if the 10-tonne release threshold is exceeded. Methanol is also subject to Part 5 substance requirements. Therefore, a report would be required under Part 5 if the VOC release threshold is exceeded (i.e., 10 tonnes of total VOCs air emissions) in Part 4 and if the amount of methanol released to air was greater than 1.0 tonne.

24. ***We have a provincial waste permit to discharge sulphuric acid at a pH between 5.8 and 6.6. How do we report our releases of sulphuric acid if we met all the reporting requirements?***
Releases of mineral acids at a pH of 6.0 or greater are considered neutralized and must be reported as zero. The portion of sulphuric acid discharged at a pH of less than 6.0 will constitute a reportable release and must be calculated and reported.

25. ***We send an NPRI substance to an outside company for recovery. The recovered substance is then sent back to us for reuse. Does the recovered substance count toward the threshold calculation?***
Yes. If the recovered substance is being processed or used it would have to be included in the threshold calculation since it is the same as new material being processed or used.

    For example, a facility uses a catalyst that contains an NPRI substance. When the catalyst is spent, it is sent off site for recovery, then returned to the facility for reuse. The facility would need to include the NPRI substance in the catalyst in their threshold calculations **each time** it was brought on site. So if the catalyst was bought new at the beginning of the reporting year and was sent off site for recovery and returned to the facility twice in the calendar year, they would need to count the amount of the NPRI substance in the catalyst three times. If the reporting threshold was met, then all releases, transfers or disposals of the substance must be reported. Therefore, the facility would need to report the amount of the NPRI substance in the spent catalyst as a transfer off site for recovery. The amount reported under this category would be calculated by adding the amount of the NPRI substance in the spent catalyst for both transfers together.

26. ***A company engaged in electroplating is using equipment and lead anodes purchased and installed before the current reporting year. Sixty kilograms of lead anodes were originally installed in the plating tanks. The lead anodes dissolve over time and the lead ends up in sludge and wastewater. During the calendar year, the company replaced 20 kg of lead anodes. Does the company have to submit an NPRI report for lead?***
Yes, as the lead mass and concentration thresholds are met (50 kg and 0.1%). The entire electrode assembly is considered to be an "other use" of lead, relevant to the purposes of the facility as defined in the *Canada Gazette* notice. The entire quantity of lead in the electrode assembly, 60 kg, must be used in the threshold calculation, not just the 20 kg consumed in the process. The facility would then be required to submit a report for the amount of lead that was released or transferred from the site.

27. ***When do metal parts, sheets or wire containing NPRI Part 1A and 1B substances lose their status as articles?***
Metal parts, sheets or wire lose their article status when releases to the environment, disposals or transfers for recycling occur.

An *article* is a manufactured item that does not release an NPRI substance under normal conditions of processing or use. When an article is processed or used and there are no resulting releases to the environment, disposals or transfers for recycling, the NPRI substances in that article do not need to be included in the threshold calculation.

However, metal parts, sheets or wires containing Part 1A substances that generate waste during processing or use, such as turnings or blanks, will retain their article status if the waste generated is completely recycled with due care within the facility. Due care is considered to have been exercised if no more than 1 kg (0.001 tonne) of a Part 1A NPRI substance is released during the calendar year as a result of the processing or other use of an article. Due care does not apply to Part 1B substances because of their low reporting thresholds.

Typical metal-processing activities that revoke article status include welding (consumable electrode processes, e.g., shielded metal arc welding, flux cored arc welding, gas-metal arc welding, submerged arc welding), soldering, torch cutting, quenching, etching and dry grinding. Refer to the *Guidance for the Reporting of Welding Activities* available in the *NPRI Toolbox* for more information on reporting to the NPRI for welding activities.

Typical metal-processing activities that do not revoke article status (assuming due care is exercised in ensuring 100% recycling of materials for Part 1A substances) include mechanical cutting, stamping, bending, punching, machining, shearing and cold extrusion.

28. ***Our company purchases metal parts and then welds them together using welding rods. We then paint them and glue other parts to them. What would be reportable in this case?***
In this case, welding rods lose their article status since they are consumed and would have to be included in the threshold calculation. The welded metal parts retain their article status, so the NPRI substances contained in them do not have to be included in the threshold calculations. Refer to the *Guidance for the Reporting of Welding Activities* for more information on reporting to NPRI for welding activities.

NPRI substances contained in the paints and glues would be reportable if the threshold criteria were met. The reporting requirememts for VOCs (Parts 4 and 5 substances) should be checked particularly since VOCs can constitute a major part of paint and glue formulations.

29. ***Is the use of fuel exempt from reporting?***
No. The use of fuel is not implicitly exempt from reporting. If the threshold criteria are met, use of fuel in a stationary system, such as for power generation, would be reportable. The combustion of fuel in stationary combustion equipment must also be considered when calculating the release thresholds for Parts 4 and 5 substances.

Retail sale, storage and fuel distribution are exempt except as part of terminal operations. Refuelling of motor vehicles is also covered by this exemption even if the vehicle is refuelled from a tank on company property. Mobile sources such as vehicles and earth-moving equipment are not stationary items considered as part of a facility; therefore, they are not to be included in the calculation of the reporting threshold.

30. ***Chromated copper arsenate (CCA) is used in the wood-treatment industry but is not on the NPRI substance list. Do we have to report?***
While CCA is not an NPRI substance, copper (Cu), chromium (Cr), arsenic (As) and their compounds are on the list. A threshold calculation must be performed for each individual substance. Furthermore, since the chromium in CCA is hexavalent, the 50-kg threshold applies for both chromium and arsenic.

A typical bulk solution of CCA (50% concentrate) contains 12.30% Cr, 7.39% Cu and 11.09% As, by weight. A company would therefore have to use 407 kg, 135 tonnes and 451 kg, respectively, of 50% concentrate of CCA to render Cr, Cu and As reportable.

31. ***Should fugitive dust from tailings dams and tailings impoundments be reported to NPRI as releases?***
Yes. NPRI substances that are released as fugitive emissions must be reported. For mines, this might include the individual metals in the dust, as well as the dust itself as a reportable particulate. The deposit of NPRI substances contained in the mineral portion of the ore or rock to a tailings pond is not reportable, but releases from the pond or dam are.

32. ***Our mine operates a wastewater treatment system for tailings impoundment effluent. The treatment process generates a metal hydroxide sludge containing two NPRI substances. The sludge is pumped back into the tailings impoundment. Are the NPRI substances in the sludge considered releases?***
Substances that are pumped back into a tailings impoundment are not considered releases. The amount of substances leaving the tailings impoundment would be reported as a release.

33. ***Should hydraulic backfill pumped underground and used for filling open stopes for ground control be reported?***
No. Stope filling for ground control is part of the extraction process and is therefore included in the mining exemption. Only the Part 4 and 5 releases from the combustion of fuel in stationary combustion equipment must be considered during this activity.

34. ***We use zinc in our primary crusher as backing for concaves and shells. Is it reportable?***
No. The mining exemption covers all activities from extraction up to and including primary crushing. However, if the primary crusher is fuel-operated, the Part 4 and 5 substances released from the combustion of fuel in the crusher must be included in the facility's threshold calculations. This is true for any stationary combustion equipment used in the mining process that falls under the exemption.

35. ***Do NPRI substances contained in a refractory brick furnace have to be reported?***
No. Refractory bricks would retain their status as articles as long as they do not release any NPRI substances during normal use. However, the refractory bricks lose their article status if during normal conditions of use they degrade and release NPRI substances. In that event, the total quantity of NPRI substances in the refractory lining must be used in the calculation of the reporting thresholds for each substance.

36. ***Our ore-processing facility uses greases and fuels in many machines used in the benefaction of the ore. Are NPRI substances in these greases and fuels reportable?***
Yes. Process equipment maintenance using materials such as grease, oils or lubricants, disinfectants or paint, etc., is not exempt and must be considered for the purposes of NPRI reporting. For the purpose of Part 1 substances, the use of greases and fuels in this situation would be considered "other use." The air releases emitted by these materials would have to be considered for Parts 4 and 5 substance reporting requirements.

37. ***We use more than 10 tonnes of sodium cyanide in our flotation beds. The substance is entirely consumed and transformed to non-ionic cyanides in the process. We met all other reporting criteria. Are we required to report?***
Yes. Reporting of NPRI Part 1A substances is based on quantity manufactured, processed or otherwise used, not on quantities released. You must perform your threshold calculations based on the amount of cyanide ion used or processed and submit a report if you met or exceeded the 10-tonne threshold. Since non-ionic forms of cyanide are not on the NPRI substance list, you would report a zero release of cyanide ion.

38. ***We use copper sulphate as a reagent. During the process, it attaches itself to other compounds and remains with the concentrate. There are no releases. Is it reportable?***
Yes. If the amount of copper met or exceeded the 10-tonne reporting threshold, you would submit a report for "copper (and its compounds)" and report a release of zero for this process. All other releases, transfers or disposals of copper from your facility would also have to be reported.

39. ***We use zinc sulphate, zinc oxide and zinc stearate. How do we handle reporting of all these different metal compounds?***
Report only the zinc portion of the compounds under the substance name "zinc (and its compounds)."

40. ***Is fuel used for fire-training purposes reportable to NPRI?***
A facility used for the education or training of students is exempt from reporting Part 1A, 1B, 2 and 3 substances. The use of fuels does not need to be reported. However, if the training facility operates a stationary combustion unit and does not qualify for the exemption (see Question 6 for explanation), then it must report CAC releases from the combustion unit that met any of the CAC mass thresholds.

The fire-training activities occurring at a facility not used exclusively for the training of students (e.g., at an airport) are not exempt from reporting. The CAC releases from the combustion of fuel for fire-training, including extinguishing structure fires, and other stationary combustion sources must be included in the CAC release threshold calculations. Any other NPRI substances manufactured, processed, otherwise used or released during the training must also be considered in the threshold calculations.

41. ***We store products in our warehouse that don't belong to us. We do not use these products in the operation of our warehouse. Some of these products contain NPRI substances. Are we required to report?***
No. A warehouse is not required to report if it does not manufacture, process or otherwise use NPRI substances. Transfer of NPRI substances between containers is considered processing. Wholesale distribution is exempt, provided there are no releases of NPRI substances.

42. ***We buy bulk NPRI substances in tanks and drums. Some of these substances are simply repackaged in smaller containers, e.g., tanks to drums, drums to 4-litre plastic bottles. However, some of the substances are mixed together and then repackaged. Are we required to report?***
Transfer of substances between containers is considered processing and those quantities must be included in the threshold calculation. Mixing of substances together prior to packaging is also considered processing and must be considered in the threshold calculation.

43. ***We use an NPRI substance in our process that met all reporting criteria. Unfortunately, we have no data on possible releases and we cannot find any estimation factors. Is a release of zero acceptable in this case?***
For Part 1A, 1B, 2, 4 and 5 substances, you are required to report based on the best available information in your posession. You must collect your facility information and identify the substances for which a report is required. You would report "zero" releases, disposals or transfers only if it is known that these substances were not released, disposed of or transferred.

If you met the reporting criteria for dioxins/furans and HCB (Part 3 substances), but have no data and cannot find emission factors, you are required to report "No information available" for any releases, disposals and transfers expected to contain these substances (e.g., releases to air from a combustion process that generates dioxins/furans).

44. ***What needs to be considered when calculating the annual threshold quantity of an NPRI substance for a soaking bath used for metal cleaning, degreasing or metal plating (electroplating) operations?***
Metal cleaning and metal plating baths are considered an "other" use of an NPRI substance, relevant to the purpose of the facility as defined in the *Canada Gazette* notice. The entire quantity of the individual NPRI substance(s) in the metal cleaning or plating bath and any quantity used to refill the bath must be used in the threshold calculation, not just the quantity consumed in the process. If the facility exceeds the threshold, the owner/operator would only report releases, disposals and transfers of the individual NPRI substance(s), even if releases, disposals and transfers are determined to be zero.

45. ***Are vinyl chloride and polyvinyl chloride (PVC) the same compound?***
No. Polyvinyl chloride is a polymer made from vinyl chloride. It is not the same substance and is not listed in NPRI; therefore, it is not reportable. Only free vinyl chloride monomer is reportable. Some formulations of pre-polymers may contain a percentage of free monomer. If you purchase pre-polymers which contain free vinyl chloride monomer, add this to the threshold calculation.

46. ***Asbestos is listed with the CAS number 1332-21-4. We use asbestos with the following names and CAS numbers: Azbolen (17068-78-9), Actinolite (77536-66-4), Amosite (12172-73-5), Anthropylite (77536-67-5), Tremolite (77536-68-6) and Serpentine. Are we required to report?***
The CAS number 1332-21-4 is defined as "Asbestos, a greyish, non-combustible fibrous material. It consists primarily of impure magnesium silicate." Asbestos with the CAS number 1332-21-4 is the general CAS number for a number of specific types of asbestos including those mentioned. Those types of asbestos would be reportable if they are in friable form.

47. ***A facility coats materials using a vacuum deposition process. When it uses aluminum for coating, is it required to report for aluminum fumes?***
In vacuum deposition, the metal is converted to a vapour state under low pressure. The vapour condenses on the material to be coated. Vapours are not fumes. A metal fume consists of finely divided particulate matter dispersed in a gas (smoke). Because vapours and fumes are different, this process would not be considered a reportable activity unless the condensation creates fumes or dust.

48. ***What types of routine maintenance are exempt?***
Routine janitorial or other facility grounds maintenance activities that use NPRI substances contained in cleaners, fertilizers or pesticides are exempt.

Process equipment maintenance using materials such as grease, oils or lubricants, disinfectants or paint, etc., is not exempt and must be considered for the purposes of NPRI reporting.

49. ***Our process uses metal grinding wheels which suffer regular abrasion. Would NPRI substances in these wheels or emitted in the air by these wheels be reportable?***
Yes. Items such as grinding wheels are, by their nature and use, intended to wear down and release substances. They are designed to be replaced and are subject to reporting.

50. Are degreasers used in a plant's maintenance shop reportable?

Yes. Degreasing of equipment for maintenance is not considered routine maintenance and is not exempt. It would be reported as "other use" (Part 1 substances) or as air releases (Part 4 and 5 substances).

51. Is our quality control laboratory exempt from reporting under the research and testing exemption?

Yes. The laboratory is exempt from reporting Parts 1A, 1B, 2 and 3 substances if it did not perform pilot-scale studies or specialty chemical production. However, if the quality control lab operates stationary combustion equipment and does not meet the exemption criteria explained in Question 6, then it must report for each CAC released from the stationary combustion equipment that exceeded the release threshold.

52. Are photo development laboratories exempt?

No. The laboratory exemption includes research facilities that perform auxiliary functions to the manufacturing or processing activities of a facility. Photo development laboratories do not perform auxiliary functions, but rather perform activities essential to the development of their products (photographs, films, etc.).

53. We buy more than 10 tonnes of chlorine gas and use it in a reaction vessel to produce more than 10 tonnes of chlorine dioxide. We then dilute the chlorine dioxide to less than 1% concentration. What do we have to report?

Because you met the 10-tonne threshold for chlorine gas, you are required to report any releases, disposals and transfers for recycling of chlorine gas. Because you manufacture chlorine dioxide at a concentration greater than 1%, you are required to report any releases, disposals and transfers of chlorine dioxide. The subsequent dilution of the chlorine dioxide does not affect the threshold calculation.

54. How do we address NPRI substances contained in industrial and commercial batteries?

Items, such as batteries, which contain NPRI substances that are not released during normal use, are considered "articles" and are not subject to reporting. However, the item loses its article status if NPRI substances were released. Also, if you recycle lead-acid batteries by crushing and removing the lead, then the batteries cease to be articles and the NPRI substances they contain must be considered in the threshold calculation.

55. How do we treat a solvent sent off site for distillation and then shipped back to us?

A solvent received from a recycling operation located off site counts as new material and must be included in the threshold calculation. The quantity sent off site for distillation must be reported as material sent for recycling.

56. We use a paint thinner that contains toluene. We also use toluene in another part of our plant. In total, more than 10 tonnes of toluene are used annually. The waste thinner is sent to an off-site facility for blending in fuels. How do we report this activity?

NPRI substances sent off site for fuel blending or that add energy to a heat-recovery activity must be reported as a transfer for energy recovery. Other releases, disposals or transfers of toluene must also be reported. In addition, any toluene released to air must be included in the calculation of the facility-wide total VOC air emissions under Part 4 (Part 4 threshold for total VOCs is 10 tonnes released to air). It would also have to be included under Part 5 if the quantity of toluene released to air was greater than 1.0 tonne.

57. Are NPRI substances used in maintenance activities, such as paint-booth cleaning, reportable?

Paint-booth cleaning is not considered a routine janitorial activity and would be reportable under the classification "other use" (Part 1 substances) or as air releases (Part 4 and 5 substances).

58. How does the NPRI definition of a facility apply to a multi-plant site?

Facility is defined in the *Canada Gazette* notice as a contiguous facility, a pipeline installation or offshore installation. A contiguous facility includes all buildings or structures located on a single site or on adjacent sites which are owned or operated by the same person and function as a single integrated site.

Plants must report separately if they manufacture, process or use unrelated products and if they do not share common operations as part of an integrated site. Characteristics of an integrated site would include, but are not limited to, common shipping/receiving equipment, common administrative staff, common management or common contact information.

59. Is reporting to NPRI mandatory under the* Canadian Environmental Protection Act, 1999 *(CEPA 1999)? If so, how will it be enforced?

If the criteria for reporting to NPRI are met, then reporting to the NPRI is mandatory as per section 46 under CEPA 1999. It is the responsibility of each person who owns or operates a facility to determine whether they are required to report after examining the *Canada Gazette* notice and the CEPA 1999, and to report for the previous calendar year by June 1 of the following year, if reporting is required. For example, the NPRI report for the 2004 calendar year is due on June 1, 2005. There is a *Compliance and Enforcement Policy* for the CEPA 1999, which dictates how regulations and notices are enforced. The *Canada Gazette* notice, the CEPA 1999 and the above-mentioned policy are available on the CEPA Registry Internet site at the following address at <www.ec.gc.ca/CEPARegistry>.

60. A pulp mill is connected to its wastewater treatment facility by a 10-km pipeline. The pipe travels on land not owned by the company. The wastewater treatment facility employs only two full-time staff. How should they report?

A wastewater treatment facility owned or operated by the company or parent company and connected to the pulp mill by any combination of a permanent continuous pipe, conveyor, tunnel or sluiceway, and which functions as part of a single integrated facility shall be considered part of the pulp mill for the purposes of reporting to NPRI.

In this case, the wastewater treatment facility is an integral part of the pulp mill and is connected to it by a permanent, continuous connection. Both facilities are operated by the same company as a single integrated site. This represents a contiguous facility, and the company's report to NPRI must include activities at the wastewater treatment facility.

61. A facility that previously reported to NPRI has been split up and now is owned and operated by two separate companies. How should they report to NPRI?

If the companies are owned or operated by the same person or controlling parties *and* function as a single integrated site, they must report as one facility. If they do not meet both of the above conditions, they must perform separate threshold calculations and report as separate facilities.

62. Are substances regulated under other legislation (e.g.,* Pest Control Products Act*) exempt from reporting to NPRI?

There is no exemption for substances regulated under other legislation.

63. Is a solid-waste landfill required to report to NPRI?

For Part 1 to 3 substances, the definition of "other use" includes disposal. For Parts 4 and 5, all stationary sources of CAC must be considered at the landfill sites. Solid-waste landfills may provide final disposal for NPRI substances. If the facility meets all threshold criteria for these substances, it is required to report. Additionally, landfills can generate, as a consequence of the disposal, by-products such as ammonia in their leachate or VOC releases to the atmosphere; therefore, a report is needed for these substances if the threshold criteria are met.

64. ***We use chlorine as an aqueous disinfectant in our water treatment facility. Will we have to report chlorine releases?***
Assuming you met the 10-tonne threshold for chlorine, you must submit a report. Chlorine, when added to water, will dissociate and no longer exist in most circumstances, resulting in a report of zero release. However, if the pH of the treated water falls below 6, you must consider the equilibrium of chlorine and hydrochloric acid (HCl), which is also a reportable substance, when performing the threshold calculations for each substance.

65. ***What activities at a chemical distribution facility would potentially trigger NPRI reporting?***
Unloading, transferring, blending and repackaging are forms of processing which can trigger NPRI reporting. All releases, disposals and transfers resulting from these activities are reportable. Substances that arrived in sealed containers and were only stored in a warehouse prior to distribution would not be included. The filling and emptying of storage tanks is also considered processing, and fugitive releases from those tanks must be included when calculating CAC release thresholds. In addition, CACs released from the stationary combustion equipment used at the chemical distribution facility must also be included in the CAC mass release thresholds.

66. ***Our mine used 200 tonnes of steel grinding balls, which contain 15–18% of chromium (excluding hexavalent chromium). These grinding balls are totally consumed during processing after primary crushing. Do we need to report for chromium?***
Approximately 30–36 tonnes of chromium (excluding hexavalent chromium) were used in processing the ore. The threshold criteria for reporting for chromium (and its compounds) has been met and you are required to report.

67. ***After primary crushing of ore at a mine, ethylene glycol (antifreeze) was applied to the crushed ore as a dust suppressant or to prevent the ore from freezing. Does this use of an NPRI substance fall under the exemption for mining in the* Canada Gazette *notice?***
No. Addition of ethylene glycol was done intentionally to aid in the further processing of ore or distribution of the ore in commerce. This is not related to the primary extraction of the mined materials and is a processing step that does not fall under the basic mining exemption and therefore must be reported to NPRI.

68. ***My facility has heating, ventilation and air conditioning (HVAC) systems and refrigerant equipment that contain halocarbons listed on the NPRI substance list. Does this use have to be considered?***
Yes. Reporting to the NPRI would be required if the HVAC systems and refrigerant equipment within a facility had a total holding capacity of 10 tonnes or greater. (Note: This does not refer to the cooling capacity of the system, which may also be expressed in tonnes. The equipment nameplate should also indicate the halocarbon capacity of each unit.) The 10-tonne threshold calculation should be completed for each halocarbon within the facility (i.e., if the chillers contain CFC-11 but the condensers and evaporators contain HCFC-22, they are not to be included in the same calculation). Also, calculations should include the quantity of halocarbon that was in the system at the beginning of the year plus any additional halocarbons that were added during refilling throughout the calendar year (i.e., during annual leak test). Halocarbons used in office and plant air conditioning systems must be included in the 10-tonne threshold calculation. Halocarbons used by employees for personal use (i.e., refrigerators in lunch rooms/cafeteria, water fountains, vending machines) are not to be included.

69. ***Our facility has a halon fire-suppression system. Do we need to report for halon?***
Halon in a fire-suppression system is considered to be an "other use" of an NPRI substance. If the fire-suppression system contains Halon 1211 or Halon 1301 in quantities equal to or greater than 10 tonnes and also meets the employee and concentration reporting criteria, the facility would be required to report to the NPRI. Also, calculations should include the quantity of halon that was used in the system at the beginning of the year, plus any additional halon added during refilling (i.e., after use or during maintenance). The type and quantity of halon will be listed on the equipment nameplate. Halons in storage are not in use and do not need to be included in a threshold calculation, although any leaks from storage must be considered.

70. As part of its process equipment, a facility has installed a catalyst containing one or more NPRI-listed substances. The catalyst has a fixed shape (pellets). Does the article exemption apply to catalysts and to NPRI substances they contain?

No. An *article* is "a manufactured item that does not release an NPRI substance, under normal conditions of processing or other use." Even though the pellets themselves appear to meet the definition of an article, there will be releases (dust emissions, spills, etc.) as a result of normal handling in installation or charging, removal for disposal, regeneration or recycling and operational use of the catalyst. Therefore, the article exemption does not apply in this case. All NPRI substances present in the catalyst must be included in the threshold calculation for each substance.

Also, due care does not apply to Part 1B substances in any case. This is because there is no quantitative measure of due care in recycling Part 1B substances. Even minimal releases of Part 1B substances can cause significant adverse effects to human health and the environment and can reasonably be expected to contribute to exceeding their low thresholds.

71. This year, we removed asbestos, used as insulation, from our facility. Are we required to submit a report for asbestos?

While asbestos is used as insulation and emits no on-site releases, it is considered an article and is exempted from reporting. However, if asbestos (friable form) is removed from any part of the facility, it loses its article status and is considered to be "otherwise used." In this case, the asbestos must be included in determining whether the facility met the 10-tonne manufacture, process or otherwise use threshold for this substance. Once the facility meets the 10-tonne threshold, a report must be submitted for asbestos, and the quantity removed from any part of the facility must be reported. This information should be reported in the NPRI software under "other use" as "ancillary or other use."

Glossary

abrasive blasting is the process of cleaning or texturing materials such as metals and ceramics with an abrasive material.

ambient means surrounding, or on all sides. For example: The air outside surrounding the facility or city is *ambient*.

alloy includes metal products containing two or more elements as a solid solution, intermetallic compounds and mixtures of metallic phases.

article means a manufactured item that does not release a substance listed in Schedule I of the *Canada Gazette* notice under normal conditions of processing or other use.

base metal means copper, lead, nickel and zinc.

biomedical or hospital waste refers to waste generated by human or animal health care facilities, medical or veterinary research and testing establishments, health care teaching establishments, clinical testing or research laboratories and facilities involved in the production or testing of vaccines. Biomedical or hospital waste includes human anatomical waste, animal waste, microbiology laboratory waste, human blood and body fluid waste and waste sharps that have not been disinfected or decontaminated. It does not include waste from animal husbandry or waste that is controlled in accordance with the *Health of Animals Act* (Canada).

boiler is an external combustion unit that turns water into steam for heating or power, or a tank for heating or storing water.

by-product means a substance, listed in Schedule I, that is incidentally manufactured, processed or otherwise used at the facility at any concentration, and released on-site to the environment, released to surface waters or disposed of.

carbon monoxide is a colourless, odourless, poisonous gas formed during the incomplete combustion of fossil fuels or the incomplete oxidation of carbon to carbon dioxide.

CAS Number means the Chemical Abstract Service Registry Number.

commercial grade natural gas consists of a high percentage of methane (generally above 85%) and varying amounts of ethane, propane, butane and inerts.

contiguous facility means all buildings, equipment, structures and stationary items that are located on a single site or on contiguous or adjacent sites and that are owned or operated by the same person and function as a single integrated site. This includes wastewater collection systems that discharge treated or untreated wastewater to surface waters.

cumulative nameplate capacity refers to the total nameplate capacities of all stationary *external* combustion equipment at the facility.

disposal means the final disposal of the material (e.g., landfill), or its treatment (e.g., stabilization) prior to final disposal.

emission means, for the purposes of reporting CAC to NPRI, any discharge of a CAC substance to air.

emission factors relates the quantity of substances emitted from a source to some common activity associated with those emissions, and can be categorized into:

a) **published emission factors**, which are those that have been published by government agencies and industry associations for application to emission sources in their particular jurisdiction or industry sector; or
b) **site-specific emission factors**, which are those that have been developed by the industrial facilities using their own specific emission-testing data and source-activity information.

employee includes a person employed at the facility, an owner who performs work on site at the facility, and a person who performs work on site at the facility on a routine basis that is related to the normal operations of the facility, for the period of time the person is performing that work, such as contractors.

external combustion equipment means any equipment with a combustion process that occurs at atmospheric pressure and with excess air.

facility means a contiguous facility, an offshore installation or a pipeline installation.

fermentation means the use of yeast to break down complex organic compounds, as in alcohol production and baking processes.

fermentor is a container in which fermentation takes place.

fossil fuel means fuel that is in a solid or liquid state at standard temperature and pressure, such as coal, petroleum or any solid or liquid fuel derived from such.

fugitive release means the total of all releases to air that are not released through confined process streams. These releases include:

- fugitive equipment leaks from valves, pump seals, flanges, compressors, sampling connections, open-ended lines, etc.,
- evaporative losses from surface impoundments and spills,
- releases from building ventilation systems, and
- any other fugitive or non-point air emissions from land treatment, mine tailings, storage piles, etc.

full-time employee equivalent means the unit obtained by dividing by 2 000 hours, the sum of:

a) the total hours worked by persons employed at the facility, and the total hours of paid vacation and of sick leave taken by persons employed at the facility,
b) the hours worked on site at the facility by the owner of the facility, if not employed by the facility, and
c) the hours worked on site at the facility by a person who performs work on a routine basis related to the normal operations of the facility, such as a contractor.

generator is an internal combustion unit that produces gas or steam, or that changes mechanical energy into electrical energy.

hazardous waste includes waste substances whose nature and quantity makes them potentially dangerous to human health and/or the environment, and that require special handling techniques. Hazardous waste is fully defined in Appendix 4.

industrial space heater is an external combustion unit used to heat a single confined area.

internal combustion equipment means any equipment with a combustion process that occurs in a confined space and above atmospheric pressure.

isokinetically refers specifically to the term "isokinetic source sampling," which means sampling in a manner where the linear velocity of the gas entering the sampling nozzle is equal to that of the undisturbed gas stream at the sampling point.

level of quantification means, in respect of a substance, the lowest concentration that can be accurately measured using sensitive but routine sampling and analytical methods.

liquefied petroleum gas (LPG or LP-gas) consists of propane, propylene, butane and butylenes; however, the most common LPG is propane. There are two grades of LPG available as heating fuels. Grade 1 fuel is intended for use in internal combustion engines operating under moderate to high engine severity. Grade 2 fuel is adequate for most industrial uses, especially where low ambient temperatures exist and uniform fuel volatility is important. Propane is also used as an alternative to gasoline and as a standby fuel for facilities with interruptible natural gas service contracts.

manufacture means to produce, prepare or compound a substance in Schedule 1 of the *Canada Gazette* notice, and includes the coincidental production of a substance listed in Schedule I, as by-product of the manufacturing, processing or other use of other substances.

nameplate capacity refers to the total designed energy input capacity of the external stationary combustion equipment.

nitrogen oxides (expressed as NO_2) includes nitric oxides (NO) (CAS No. 10102-43-9) and nitrogen dioxide (NO_2) (CAS No. 1012-44-0). Nitrogen and oxygen in air at high temperatures can combine to form nitrogen oxides (NO_x). Furthermore, fuel combustion at high temperatures and industrial processes produce NO_x. In addition, the nitrogen content found in fuels also increases the amount of NO_x produced.

non-hazardous solid waste means any waste, regardless of origin, that might normally be disposed of in a non-secure manner, such as at a sanitary landfill site, if not incinerated.

number (or Type) 1 or 2 fuel oils are distillate oils suitable for use in liquid-fuel-burning equipment without preheating. Type 1 fuel oil is primarily intended for use in sleeve type, wick fed and most vapourizing pot-type burners. Type 2 fuel oil is a heavier distillate than Type 1, and is intended for use in medium-capacity, commercial-industrial burners, where ease of handling and availability justify its use. Neither Type 1 nor 2 fuel oils include heavy fuel oils or residual oils.

offshore installation means an offshore drilling unit, production platform or ship or subsea installation attached or anchored to the continental shelf of Canada in connection with the exploitation of oil or gas.

other use includes any use or disposal of a substance listed in Schedule 1 of the *Canada Gazette* notice relevant to the purpose of the facility that is not included under the definitions of manufacture or process.

parent company means the highest-level company or group of companies that own or directly control the reporting facility.

pipeline installation means a collection of equipment situated at a single site, used in the operation of a natural gas transmission or distribution pipeline.

$PM_{2.5}$ means any particulate matter with a diameter less than or equal to 2.5 microns.

PM_{10} means any particulate matter with a diameter less than or equal to 10 microns.

pollution prevention means the use of processes, practices, materials, products, substances or energy that avoid or minimize the creation of pollutants and waste, and reduce the overall risk to the environment or human health.

ppm means the concentration in units of parts per million.

process means the preparation for commercial distribution of a substance listed in Schedule I of the *Canada Gazette* notice after its manufacture, and includes preparation of a substance in the same physical state or chemical form as that received by the facility, or preparation that produces a change in physical state or chemical form.

recycling includes any activity that prevents a material or a component of the material from becoming a material destined for disposal.

release means the emission or discharge of a substance from the facility site to air, surface waters or, under certain circumstances, to land (e.g., spills, leaks).

secondary aluminum means aluminum-bearing scrap or aluminum-bearing materials.

secondary lead means lead-bearing scrap or lead-bearing materials, other than lead-bearing concentrates derived from a mining operation.

sewage sludge means sludge from a facility treating wastewater from a sanitary sewer system. The drying of sludge to reduce water content is part of the incineration stage.

sludge means a semi-liquid mass removed from a liquid flow of wastes.

stationary combustion equipment means any combustion equipment that needs to be stationary in order to function or operate properly or is not capable of self-propulsion.

stationary, external combustion equipment refers to any stationary equipment with a combustion process that occurs at atmospheric pressure and with excess air. This may include thermal electric generating plants, industrial boilers and commercial and domestic combustion units. Commercial grade natural gas, liquefied petroleum gas and Number 1 and 2 fuel oils are among the fuels used.

sulphur dioxide (SO_2) is formed during oxidation reactions involving sulphur and oxygen. SO_2 emissions are generated primarily from the smelting of ore and fuel combustion.

terminal operations means:

a) the use of storage tanks and associated equipment at a site used to store or transfer crude oil, artificial crude or intermediates of fuel products into or out of a pipeline, or
b) operating activities of a primary distribution installation normally equipped with floating-roof tanks that receives gasoline by pipeline, rail car, marine vessel or directly from a refinery.

total particulate matter means any particulate matter with a diameter less than 100 microns.

toxicity equivalent (TEQ) means a mass or concentration that is a sum of the masses or concentrations of individual congeners of polychlorinated dibenzo-*p*-dioxins and polychlorinated dibenzofurans multiplied by weighting factors set out in Section 4.8.1 "What are Toxic Equivalents (TEQs) of Dioxins/Furans?"

treatment means subjecting the substance to physical, chemical, biological or thermal processes at an off-site location prior to final disposal.

turbine is an internal combustion unit that is driven by the pressure of steam, water, air, etc., against the curved vanes of a wheel or set of wheels attached to a drive shaft.

virtual elimination of a toxic substance released into the environment as a result of human activity is defined in subsection 65(1) of the CEPA 1999, as "the ultimate reduction in the quantity or concentration of the substance in the release below the level of quantification." Substances that are determined to be CEPA-toxic, persistent, bioaccumulative and primarily the result of human activity are slated for virtual elimination.

volatile organic compounds are discussed in Section 3.8 "Reporting Criteria for Part 4 Substances – Criteria Air Contaminants (CACs)," and defined in Appendix 5.

volatile organic compound species are discussed in Section 3.9 "Reporting Criteria for Part 5 Substances – Speciated Volatile Organic Compounds (VOCs)."

waste incinerator is a device, mechanism or structure constructed primarily to thermally treat (e.g., combust or pyrolyze) a waste for the purpose of reducing its volume or destroying hazardous chemicals or pathogens present in the waste.

wastewater collection system is the system of sewers and/or ditches that convey sanitary or combined sewage for a community. A collection system includes adjacent service areas or adjoining sewage sheds that function as a single integrated system for a community.

wastewater treatment system means a plant or process location that accepts collection system flows of a community for the purposes of removing substances from the wastewater.

wood preservation means the use of a preservative for the preservation of wood by means of heat or pressure treatment, or both, and includes the manufacture, blending or reformulation of wood preservatives for that purpose.

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Publications of the U.S. Environmental Protection Agency

Guidance Documents for Reporting to the Toxics Release Inventory

In 1988 and 1990, the Office of Pollution Prevention and Toxics of the U.S. Environmental Protection Agency (U.S. EPA) developed many industry-specific guidance manuals to help industries estimate the releases for reporting to the Toxics Release Inventory (TRI). Since 1998, some of these manuals have been revised and some additional industry-specific guidance manuals have been prepared. These manuals, listed below, could also be used for reporting to NPRI.

Estimating Chemical Releases from Monofilament Fiber Manufacturing,
EPA 560/4-88-004a (January, 1988).

Estimating Chemical Releases from Printing Operations,
EPA 560/4-88-004b (January, 1988).

Estimating Chemical Releases from Electrodeposition of Organic Coatings,
EPA 560/4-88-004c (January, 1988).

Estimating Chemical Releases from Spray Application of Organic Coatings,
EPA 560/4-88-004d (January, 1988).

Estimating Chemical Releases from Semi-Conductor Manufacturing,
EPA 560/4-88-004e (January, 1988).

Estimating Chemical Releases from Formulation of Aqueous Solutions,
EPA 560/4-88-004f (March, 1988).

Estimating Chemical Releases from Electroplating Operations,
EPA 560/4-88-004g (January, 1988).

Estimating Chemical Releases from Textile Dyeing,
EPA 560/4-88-004h (February, 1988).

Estimating Chemical Releases from Presswood and Laminated Wood Products Manufacturing,
EPA 560/4-88-004i (March, 1988).

Estimating Chemical Releases from Roller, Knife, and Gravure Coating Operations,
EPA 560/4-88-004j (February, 1988).

Estimating Chemical Releases from Paper and Paperboard Production,
EPA 560/4-88-004k (February, 1988).

Estimating Chemical Releases from Leather Tanning and Finishing,
EPA 560/4-88-0041 (February, 1988).

Estimating Chemical Releases from Wood Preserving Operations,
EPA 560/4-88-004p (February, 1988).

Estimating Chemical Releases from Rubber Production and Compounding Operations,
EPA 560/4-88-004q (March, 1988).

Issue Paper – Clarification and Guidance for the Metal Fabrication Industry,
EPA-560/4-90-012 (January, 1990).

Guidance for Food Processors,
EPA 560/4-90-014 (June, 1990).

EPCRA Section 313 Reporting Guidance For Food Processors (Update),
EPA 745-R-98-011 (September, 1998).

EPCRA Section 313 Reporting Guidance for Spray Application and Electrodeposition of Organic Coatings,
EPA 745-R-98-014 (December, 1998).

Industry Guidance for Coal Mining Facilities,
EPA 745-B-99-002 (January, 1999).

Industry Guidance for Electricity Generating Facilities,
EPA 745-B-99-003 (January, 1999).

Industry Guidance for Metal Mining Facilities,
EPA 745-B-99-001 (January, 1999).

Industry Guidance for Chemical Distribution Facilities,
EPA 745-B-99-005 (January, 1999).

Industry Guidance for RCRA Subtitle C TSD Facilities and Solvent Recovery Facilities,
EPA 745-B-99-004 (January, 1999).

Industry Guidance for Petroleum Terminals and Bulk Storage Facilities,
EPA 745-B-99-006 (January, 1999).

EPCRA Section 313 Reporting Guidance for Semiconductor Manufacturing,
EPA 745-R-99-007 (July, 1999).

EPCRA Section 313 Reporting Guidance for Leather Tanning and Finishing Industry,
EPA 745-B-00-012 (April, 2000).

EPCRA Section 313 Reporting Guidance for the Printing, Publishing, and Packaging Industry,
EPA 745-B-00-005 (May, 2000).

EPCRA Section 313 Reporting Guidance for Rubber and Plastics Manufacturing,
EPA 745-B-00-017 (May, 2000).

EPCRA Section 313 Reporting Guidance for the Textile Processing Industry,
EPA 745-B-00-008 (May, 2000).

EPCRA Section 313 Reporting Guidance for the Presswood and Laminated Products Industry,
EPA 260-B-01-013 (August, 2001).

In addition, the U.S. EPA has developed a group of guidance documents specific to individual chemicals and chemical categories. Some of these documents are relevant to reporting to NPRI and are listed below.

Guidance for Reporting Aqueous Ammonia – Revised,
EPA 745-R-00-005 (December, 2000).

List of Toxic Chemicals Within The Water Dissociable Nitrate Compounds Category and Guidance for Reporting – Revised,
EPA 745-R-00-006 (December, 2000).

Guidance for Reporting Sulfuric Acid (acid aerosols including mists, vapors, gas, fog, and other airborne forms of any particle size),
EPA 745-R-97-007 (November, 1997, and updated March, 1998).

Guidance for Reporting Toxic Chemicals within the Polycyclic Aromatic Compounds Category (Final),
EPA 260-B-01-03 (August, 2001).

List of Toxic Chemicals within the Polychlorinated Alkanes Category and Guidance for Reporting,
EPA 745-B-99-023 (June, 1999).

Guidance for Reporting Hydrochloric Acid (acid aerosols including mists, vapors, gas, fog, and other airborne forms of any particle size),
EPA 745-B-99-014 (December, 1999).

Guidance for Reporting Toxic Chemicals Within the Dioxin and Dioxin-like Compounds Category (Final),
EPA 260-B-01-004 (August, 2001).

Locating and Estimating (L&E) Documents

To assist groups interested in preparing inventories of air emissions of various potentially toxic substances, the U.S. EPA Office of Air Quality and Planning Standards has prepared a series of locating and estimating (L&E) documents that compile available information on sources and emissions of these substances. Documents in this series are listed below:

Substance	EPA Publication #	Publication Date
Acrylonitrile	EPA-450/4-84-007a	1984
Arsenic and Arsenic Compounds	EPA-454/R-98-013	June 1998
Benzene	EPA-450/4-84-007q	1988
Benzene	EPA-450/R-98-011	June 1998
1,3-Butadiene	EPA-454/R-96-008	November 1996
Cadmium and Cadmium Compounds	EPA-454/R-93-040	September 1993
Carbon Tetrachloride	EPA-450/4-84-007b	March 1984
Chlorobenzenes	EPA-454/R-93-044	March 1994
Chloroform	EPA-450/4-84-007c	March 1984
Chromium	EPA-450/4-84-007g	July 1984
Chromium (Supplement)	EPA-450/2-89-002	August 1989
Coal and Oil Combustion Sources	EPA 450/2-89-001	1989
Cyanide	EPA-454/R-93-041	September 1993
Dioxins and Furans	EPA-454/R-97-003	May 1997
Epichlorohydrin	EPA-450/4-84-007j	March 1984
Ethylene Dichloride	EPA-450/4-84-007d	March 1984
Ethylene Oxide	EPA-450/4-84-007l	September 1986
Formaldehyde	EPA-450/4-91-012	March 1991
Lead	EPA-454/R-98-006	May 1998
Manganese	EPA-450/4-84-007h	1986
Medical Waste Incinerators	EPA-454/R-93-053	1993
Mercury and Mercury Compounds	EPA-454/R-97-012	December 1997
Methylene Chloride	EPA-454/R-93-006	February 1993
Methyl Ethyl Ketone	EPA-454/R-93-046	March 1994
Municipal Waste Combustion	EPA-450/2-89-006	1989
Nickel	EPA-450/4-84-007f	1984
Organic Liquid Storage Tanks	EPA-450/4-88-004	1988
Perc and Trichloroethylene	EPA 450/2-89-013	1989
Phosgene	EPA-450/4-84-007i	1986
Polycyclic Organic Matter	EPA-454/R-98-014	July 1998
Sewage Sludge Incinerators	EPA 450/2-90-009	1990
Styrene	EPA-454/R-93-011	April 1993
Toluene	EPA-454/R-93-047	March 1994
Vinylidene Chloride	EPA-450/4-84-007k	September 1985
Xylene	EPA-454/R-93-048	March 1994

Other Documents from the U.S. EPA

Compilation of Air Pollutant Emission Factors, Vol. 1: Stationary Point and Area Sources, U.S. EPA, *AP-42*, 5th Edition (1996), and *AP-42* Supplements A, B, C, D, E and F (1996, 1997, 1998, 1999 and 2000).

Toxic Air Pollutant Emission Factors – A Compilation for Selected Air Toxic Compounds and Sources, Second Edition, U.S. EPA, EPA 450/2-90-011 (1990).

Protocols for Equipment Leak Emission Estimates, U.S. EPA, EPA 453/R-95-017 (November, 1995).

Hot Mix Asphalt Plants – Emission Assessment Report (Draft), U.S. EPA, EPA 454/R-00-0XX (June, 2000).

Development of Particulate and Hazardous Emission Factors for Electric Arc Welding (AP- 42, Section 12.19) Revised Final Report, U.S. EPA, EPA (May, 1994).

Copies of the U.S. EPA documents are available from:

U.S. Environmental Protection Agency
National Center For Environmental Publications and Information (NCEPI)
P.O. Box 42419
Cincinnati, OH 45242
U.S.A.

Tel: (513) 489-8190, Fax: (513) 489-8695

U.S. EPA documents can be downloaded from the U.S. Toxics Release Inventory (TRI) Web site at <www.epa.gov/tri> or the U.S. EPA's Technology Transfer Network Web site at <www.epa.gov/ttn/chief/>.

Or, they can be ordered from:

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
U.S.A.

Tel: (703) 605-6000
Fax: (703) 605-6900
E-mail: orders@ntis.fedworld.gov
Web site: www.ntis.gov

Documents Produced by Industry Associations

American Petroleum Institute (2000). *Evaporative Loss from Fixed Roof Tanks*, Publication 2516.

American Petroleum Institute (1996). *Evaporation Loss from Internal Floating Roof Tanks*, Publication 2519.

American Petroleum Institute (1994). *Evaporation Loss from External Floating Roof Tanks*, Publication 2517.

American Petroleum Institute (1992). *Review of Air Toxic Emission Calculations from Storage Tanks, Air Toxic Emissions Calculation Validation Program: Analysis of Crude Oil and Refined Product Samples and Comparison of Vapor Composition to Model Predictions*, Publication 2525.

Copies of the above reports can be ordered from:

American Petroleum Institute
Order Desk
1200 L Street Northwest
Washington, DC 20005
U.S.A.

Tel: (202) 682-8375
Fax: (202) 962-4776

Canadian Petroleum Products Institute (2004). "Code of Practice for Developing a Refinery Emission Inventory," available at <www.cppi.ca>.

Environment Canada Guidance Documents

Environment Canada (2003). "Guidance for Wood Preservation Facilities Reporting to the National Pollutant Release Inventory," in collaboration with the Canadian Institute of Treated Wood.

Environment Canada (2004). "National Pollutant Release Inventory Guidance Manual for the Wastewater Sector." *NPRI Toolbox.* <www.ec.gc.ca/pdb/npri/documents/2004ToolBox/toolBox_e.cfm>.

These documents can be downloaded from the NPRI Web site at <www.ec.gc.ca/npri>.

General Information

Howard, P. H. and M. Neal (1992). *Dictionary of Chemical Names and Synonyms,* Chelsea, MI: Lewis Publishers.

Lide, David R. (1995). *CRC Handbook of Chemistry and Physics.* 75th Edition. Boca Raton, FL: CRC Press, Inc.

Appendix 1 – Overview of Substances and Thresholds for Reporting to the 2004 NPRI *(Reproduced from page 5 for easy reference.)*

Part Number	Substance	Mass Threshold	Concentration Threshold	Unit for Reporting
Threshold Based on Quantity Manufactured, Processed or Otherwise Used				
1A	231 core substances	10 tonnes	1%	tonnes
1B	mercury[1]	5 kg	n/a	kg
	cadmium[1]	5 kg	0.1%	kg
	arsenic[1] hexavalent chromium compounds lead[2] tetraethyl lead	50 kg	0.1%	kg
Polycyclic Aromatic Hydrocarbons (PAHs) – Threshold Based on Special Criteria				
2	17 individual PAHs	incidental manufacture and release, disposal or transfer for recycling of 50 kg total, or any quantity for wood preservation using creosote	n/a	kg
Dioxins/Furans and Hexachlorobenzene (HCB) – No Threshold. Obligatory Reporting for Facilities Used for or Engaged in Specific Activities				
3	dioxins/furans HCB	activity-based	n/a	g TEQ[3], g
Criteria Air Contaminants (CACs) – Threshold Based on Quantity Released to Air				
4	carbon monoxide oxides of nitrogen sulphur dioxide total particulate matter	20 tonnes	n/a	tonnes
	volatile organic compounds	10 tonnes	n/a	tonnes
	PM_{10}[4]	0.5 tonnes	n/a	tonnes
	$PM_{2.5}$[5]	0.3 tonnes	n/a	tonnes
Speciated Volatile Organic Compounds (VOCs) – Additional Reporting Requirements				
5	60 VOCs including individual substances, isomer groups and other groups and mixtures	1 tonne of 10-tonne air release threshold for VOCs (Part 4) has been met	n/a	tonnes

n/a – not applicable

[1] and its compounds

[2] and its compounds, except tetraethyl lead (CAS No. 78-00-2); does not include lead (and its compounds) contained in stainless steel, brass or bronze alloys

[3] See 4.8.1, "What Are Toxic Equivalents (TEQs) of Dioxins/Furans" for an explanation of these units

[4] See glossary for definition of PM_{10}

[5] See glossary for definition of $PM_{2.5}$

Appendix 1 (continued)

The substances are listed alphabetically in six parts. The reporting criteria for the substances listed in each Part differ and are explained in Step 1. Explanations of the footnotes and substance qualifiers are also provided in Step 1.

Part 1A Substances

Name	CAS Number[1]	Name	CAS Number[1]
Acetaldehyde	75-07-0	C.I. Solvent Yellow 14	842-07-9
Acetonitrile	75-05-8	Calcium cyanamide	156-62-7
Acetophenone	98-86-2	Calcium fluoride	7789-75-5
Acrolein	107-02-8	Carbon disulphide	75-15-0
Acrylamide	79-06-1	Carbon tetrachloride	56-23-5
Acrylic acid [2]	79-10-7	Carbonyl sulphide	463-58-1
Acrylonitrile	107-13-1	Catechol	120-80-9
Alkanes, C_{6-18}, chloro	68920-70-7	CFC-11	75-69-4
Alkanes, C_{10-13}, chloro	85535-84-8	CFC-12	75-71-8
Allyl alcohol	107-18-6	CFC-13	75-72-9
Allyl chloride	107-05-1	CFC-114	76-14-2
Aluminum [3]	7429-90-5	CFC-115	76-15-3
Aluminum oxide [4]	1344-28-1	Chlorendic acid	115-28-6
Ammonia (total) [5]	*	Chlorine	7782-50-5
Aniline [2]	62-53-3	Chlorine dioxide	10049-04-4
Anthracene	120-12-7	Chloroacetic acid [2]	79-11-8
Antimony [6]	*	Chlorobenzene	108-90-7
Asbestos [7]	1332-21-4	Chloroethane	75-00-3
Benzene	71-43-2	Chloroform	67-66-3
Benzoyl chloride	98-88-4	Chloromethane	74-87-3
Benzoyl peroxide	94-36-0	3-Chloro-2-methyl-1-propene	563-47-3
Benzyl chloride	100-44-7	3-Chloropropionitrile	542-76-7
Biphenyl	92-52-4	Chromium [8]	*
Bis(2-ethylhexyl) adipate	103-23-1	Cobalt [6]	*
Bis(2-ethylhexyl) phthalate	117-81-7	Copper [6]	*
Boron trifluoride	7637-07-2	Cresol [2,9]	1319-77-3
Bromine	7726-95-6	Crotonaldehyde	4170-30-3
1-Bromo-2-chloroethane	107-04-0	Cumene	98-82-8
Bromomethane	74-83-9	Cumene hydroperoxide	80-15-9
1,3-Butadiene	106-99-0	Cyanides [10]	*
2-Butoxyethanol	111-76-2	Cyclohexane	110-82-7
Butyl acrylate	141-32-2	Cyclohexanol	108-93-0
i-Butyl alcohol	78-83-1	Decabromodiphenyl oxide	1163-19-5
n-Butyl alcohol	71-36-3	2,4-Diaminotoluene [2]	95-80-7
sec-Butyl alcohol	78-92-2	2,6-Di-*t*-butyl-4-methylphenol	128-37-0
tert-Butyl alcohol	75-65-0	Dibutyl phthalate	84-74-2
Butyl benzyl phthalate	85-68-7	*o*-Dichlorobenzene	95-50-1
1,2-Butylene oxide	106-88-7	*p*-Dichlorobenzene	106-46-7
Butyraldehyde	123-72-8	3,3'-Dichlorobenzidine dihydrochloride	612-83-9
C.I. Acid Green 3	4680-78-8	1,2-Dichloroethane	107-06-2
C.I. Basic Green 4	569-64-2	Dichloromethane	75-09-2
C.I. Basic Red 1	989-38-8	2,4-Dichlorophenol [2]	120-83-2
C.I. Direct Blue 218	28407-37-6	1,2-Dichloropropane	78-87-5
C.I. Disperse Yellow 3	2832-40-8	Dicyclopentadiene	77-73-6
C.I. Food Red 15	81-88-9	Diethanolamine [2]	111-42-2
C.I. Solvent Orange 7	3118-97-6	Diethyl phthalate	84-66-2

Name	CAS Number[1]
Diethyl sulphate	64-67-5
Dimethylamine	124-40-3
N,N-Dimethylaniline [2]	121-69-7
N,N-Dimethylformamide	68-12-2
Dimethyl phenol	1300-71-6
Dimethyl phthalate	131-11-3
Dimethyl sulphate	77-78-1
4,6-Dinitro-*o*-cresol [2]	534-52-1
2,4-Dinitrotoluene	121-14-2
2,6-Dinitrotoluene	606-20-2
Dinitrotoluene [11]	25321-14-6
Di-*n*-octyl phthalate	117-84-0
1,4-Dioxane	123-91-1
Diphenylamine	122-39-4
Epichlorohydrin	106-89-8
2-Ethoxyethanol	110-80-5
2-Ethoxyethyl acetate	111-15-9
Ethyl acrylate	140-88-5
Ethylbenzene	100-41-4
Ethyl chloroformate	541-41-3
Ethylene	74-85-1
Ethylene glycol	107-21-1
Ethylene oxide	75-21-8
Ethylene thiourea	96-45-7
Fluorine	7782-41-4
Formaldehyde	50-00-0
Formic acid	64-18-6
Halon 1211	353-59-3
Halon 1301	75-63-8
HCFC-22	75-45-6
HCFC-122 and all isomers [12]	41834-16-6
HCFC-123 and all isomers [13]	34077-87-7
HCFC 124 and all isomers [14]	63938-10-3
HCFC-141b	1717-00-6
HCFC-142b	75-68-3
Hexachlorocyclopentadiene	77-47-4
Hexachloroethane	67-72-1
Hexachlorophene	70-30-4
n-Hexane	110-54-3
Hydrazine [2]	302-01-2
Hydrochloric acid	7647-01-0
Hydrogen cyanide	74-90-8
Hydrogen fluoride	7664-39-3
Hydrogen sulphide	7783-06-4
Hydroquinone [2]	123-31-9
Iron pentacarbonyl	13463-40-6
Isobutyraldehyde	78-84-2
Isophorone diisocyanate	4098-71-9
Isoprene	78-79-5
Isopropyl alcohol	67-63-0
p,p'-Isopropylidenediphenol	80-05-7
Isosafrole	120-58-1
Lithium carbonate	554-13-2
Maleic anhydride	108-31-6
Manganese [6]	*
2-Mercaptobenzothiazole	149-30-4
Methanol	67-56-1
2-Methoxyethanol	109-86-4
2-Methoxyethyl acetate	110-49-6
Methyl acrylate	96-33-3
Methyl *tert*-butyl ether	1634-04-4
p,p'-Methylene*bis*(2-chloroaniline)	101-14-4
1,1-Methylene*bis* (4-isocyanatocyclohexane)	5124-30-1
Methylene*bis*(phenylisocyanate)	101-68-8
p,p'-Methylenedianiline	101-77-9
Methyl ethyl ketone	78-93-3
Methyl iodide	74-88-4
Methyl isobutyl ketone	108-10-1
Methyl methacrylate	80-62-6
N-Methylolacrylamide	924-42-5
2-Methylpyridine	109-06-8
N-Methyl-2-pyrrolidone	872-50-4
Michler's ketone [2]	90-94-8
Molybdenum trioxide	1313-27-5
Naphthalene	91-20-3
Nickel [6]	*
Nitrate ion [15]	*
Nitric acid	7697-37-2
Nitrilotriacetic acid [2]	139-13-9
p-Nitroaniline	100-01-6
Nitrobenzene	98-95-3
Nitroglycerin	55-63-0
p-Nitrophenol [2]	100-02-7
2-Nitropropane	79-46-9
N-Nitrosodiphenylamine	86-30-6
Nonylphenol and its ethoxylates[16]	*
Octylphenol and its ethoxylates[17]	*
Paraldehyde	123-63-7
Pentachloroethane	76-01-7
Peracetic acid [2]	79-21-0
Phenol [2]	108-95-2
p-Phenylenediamine [2]	106-50-3
o-Phenylphenol [2]	90-43-7
Phosgene	75-44-5
Phosphorus [18]	7723-14-0
Phosphorus (total)[19]	*
Phthalic anhydride	85-44-9
Polymeric diphenylmethane diisocyanate	9016-87-9
Potassium bromate	7758-01-2
Propargyl alcohol	107-19-7
Propionaldehyde	123-38-6
Propylene	115-07-1
Propylene oxide	75-56-9
Pyridine [2]	110-86-1
Quinoline [2]	91-22-5
p-Quinone	106-51-4

Name	CAS Number[1]
Safrole	94-59-7
Selenium [6]	*
Silver [6]	*
Sodium fluoride	7681-49-4
Sodium nitrite	7632-00-0
Styrene	100-42-5
Styrene oxide	96-09-3
Sulphur hexafluoride	2551-62-4
Sulphuric acid	7664-93-9
1,1,1,2-Tetrachloroethane	630-20-6
1,1,2,2-Tetrachloroethane	79-34-5
Tetrachloroethylene	127-18-4
Tetracycline hydrochloride	64-75-5
Thiourea	62-56-6
Thorium dioxide	1314-20-1
Titanium tetrachloride	7550-45-0
Toluene	108-88-3
Toluene-2,4-diisocyanate	584-84-9
Toluene-2,6-diisocyanate	91-08-7
Toluenediisocyanate [11]	26471-62-5
1,2,4-Trichlorobenzene	120-82-1
1,1,2-Trichloroethane	79-00-5
Trichloroethylene	79-01-6
Triethylamine	121-44-8
1,2,4-Trimethylbenzene	95-63-6
2,2,4-Trimethylhexamethylene diisocyanate	16938-22-0
2,4,4-Trimethylhexamethylene diisocyanate	15646-96-5
Vanadium [20]	7440-62-2
Vinyl acetate	108-05-4
Vinyl chloride	75-01-4
Vinylidene chloride	75-35-4
Xylene [21]	1330-20-7
Zinc [6]	*

See Step 1 for an explanation of these qualifiers.

* No single CAS number applies to this NPRI listing.

1 CAS Registry Number denotes the Chemical Abstracts Service Registry Number, as appropriate.

2 "and its salts" – The CAS number corresponds to the weak acid or base. However, the substance includes the salts of these weak acids and bases. When calculating the weight of these substances and their salts, use the molecular weight of the acid or base, not the total weight of the salt.

3 "fume or dust"

4 "fibrous forms"

5 "Ammonia (total)" means the total of both of ammonia (NH_3 – CAS No. 7664-41-7) and the ammonium ion (NH_4^+) in solution.

6 "and its compounds"

7 "friable form"

8 "and its compounds" except hexavalent chromium compounds

9 "all isomers" including the individual isomers of cresol: *m*-cresol (CAS No. 108-39-4), *o*-cresol (CAS No. 95-48-7) and *p*-cresol (CAS No. 106-44-5)

10 "ionic"

11 "mixed isomers"

12 "all isomers" including, but not limited to, HCFC-122 (CAS No. 354-21-2)

13 "all isomers" including, but not limited to, HCFC-123 (CAS No. 306-83-2) and HCFC 123a (CAS No. 90454-18-5)

14 "all isomers" including, but not limited to, HCFC 124 (CAS No. 2837-89-0), and HCFC 124a (CAS No. 354-25-6)

15 "in solution at a pH of 6.0 or greater"

16 Includes nonylphenol, its ethoxylates and derivatives with CAS numbers: 104-40-5; 25154-52-3; 84852-15-3; 1323-65-5; 26523-78-4; 28987-17-9; 68081-86-7; 68515-89-9; 68515-93-5; 104-35-8; 20427-84-3; 26027-38-3; 27177-05-5; 27177-08-8; 28679-13-2; 27986-36-3; 37251-69-7; 7311-27-5; 9016-45-9; 27176-93-8; 37340-60-6; 51811-79-1; 51938-25-1; 68412-53-3; 9051-57-4; 37205-87-1; 68412-54-4; 127087-87-1.

17 Includes octylphenol and its ethoxylates with the following CAS numbers: 140-66-9; 1806-26-4; 27193-28-8; 68987-90-6; 9002-93-1; 9036-19-5.

18 "yellow or white"

19 Does not include phosphorus (yellow or white) with CAS Number 7723-14-0.

20 "(except when in an alloy) and its compounds"

21 "all isomers" including the individual isomers of xylene: *m*-xylene (CAS No. 108-38-3), *o*-xylene (CAS No. 95-47-6) and *p*-xylene (CAS No. 106-42-3)

Part 1B Substances

Name	CAS Number[1]	Name	CAS Number[1]
Part 1B Substances			
Mercury [6]	*	Hexavalent chromium compounds	*
Cadmium[6]	*	Lead[22, 23]	*
Arsenic[6]	*	Tetraethyl lead	78-00-2

22 "and its compounds" except tetraethyl lead

23 Does not include lead (and its compounds) contained in stainless steel, brass or bronze alloys.

Part 2 Substances

Name	CAS Number[1]	Name	CAS Number[1]
Benzo(a)anthracene	56-55-3	Dibenzo(a,h)anthracene	53-70-3
Benzo(a)phenanthrene	218-01-9	Dibenzo(a,i)pyrene	189-55-9
Benzo(a)pyrene	50-32-8	7H-Dibenzo(c,g)carbazole	194-59-2
Benzo(b)fluoranthene	205-99-2	Fluoranthene	206-44-0
Benzo(e)pyrene	192-97-2	Indeno(1,2,3-c,d)pyrene	193-39-5
Benzo(g,h,i)perylene	191-24-2	Perylene	198-55-0
Benzo(j)fluoranthene	205-82-3	Phenanthrene	85-01-8
Benzo(k)fluoranthene	207-08-9	Pyrene	129-00-0
Dibenz(a,j)acridine	224-42-0		

Part 3 Substances

Name	CAS Number[1]
Hexachlorobenzene	118-74-1
Dioxins and Furans [24]	*

See Steps 1 and 2 for an explanation of this footnote.

24 This class of substances is restricted to the following congeners:
2,3,7,8-Tetrachlorodibenzo-*p*-dioxin (1746-01-6);
1,2,3,7,8-Pentachlorodibenzo-*p*-dioxin (40321-76-4);
1,2,3,4,7,8-Hexachlorodibenzo-*p*-dioxin (39227-28-6);
1,2,3,7,8,9-Hexachlorodibenzo-*p*-dioxin (19408-74-3);
1,2,3,6,7,8-Hexachlorodibenzo-*p*-dioxin (57653-85-7);
1,2,3,4,6,7,8-Heptachlorodibenzo-*p*-dioxin (35822-46-9);
Octachlorodibenzo-*p*-dioxin (3268-87-9);
2,3,7,8-Tetrachlorodibenzofuran (51207-31-9);
2,3,4,7,8-Pentachlorodibenzofuran (57117-31-4);
1,2,3,7,8-Pentachlorodibenzofuran (57117-41-6);
1,2,3,4,7,8-Hexachlorodibenzofuran (70648-26-9);
1,2,3,7,8,9-Hexachlorodibenzofuran (72918-21-9);
1,2,3,6,7,8-Hexachlorodibenzofuran (57117-44-9);
2,3,4,6,7,8-Hexachlorodibenzofuran (60851-34-5);
1,2,3,4,6,7,8-Heptachlorodibenzofuran (67562-39-4);
1,2,3,4,7,8,9-Heptachlorodibenzofuran (55673-89-7); and
Octachlorodibenzofuran (39001-02-0).

Part 4 Substances

Name	CAS Number[1]	Name	CAS Number[1]
Carbon monoxide	630-08-0	PM_{10} [26]	*
Oxides of nitrogen (expressed as NO_2)	11104-93-1	Sulphur dioxide	7446-09-5
$PM_{2.5}$ [25]	*	Total particulate matter[27]	*
		Volatile organic compounds[28]	*

25 means any particulate matter with a diameter less than or equal to 2.5 microns
26 means any particulate matter with a diameter less than or equal to 10 microns
27 means any particulate matter with a diameter less than 100 microns
28 Refer to Appendix 5 for definition of VOC.

Part 5 Substances

Individual Substances

Name	CAS Number[1]	Name	CAS Number[1]
Acetylene	74-86-2	D-Limonene	5989-27-5
Adipic acid	124-04-9	Methanol	67-56-1
Aniline[2]	65-53-3	Methyl ethyl ketone	78-93-3
Benzene	71-43-2	2-Methyl-3-hexanone	7379-12-6
1,3-Butadiene	106-99-0	Methyl isobutyl ketone	108-10-1
2-Butoxyethanol	111-76-2	Myrcene	123-35-3
n-Butyl acetate	123-86-4	Beta-Phellandrene	555-10-2
Chlorobenzene	108-90-7	Phenyl isocyanate	103-71-9
p-Dichlorobenzene	106-46-7	Alpha-Pinene	80-56-8
1,2-Dichloroethane	107-06-2	Beta-Pinene	127-91-3
Dimethylether	115-10-6	Propane	74-98-6
Ethyl alcohol	64-17-5	Propylene	115-07-1
Ethyl acetate	141-78-6	Styrene	100-42-5
Ethylene	74-85-1	1,2,4-Trimethylbenzene	95-63-6
Formaldehyde	50-00-0	Trimethylfluorosilane	420-56-4
n-Hexane	110-54-3	Toluene	108-88-3
Isopropyl alcohol	67-63-0	Vinyl acetate	108-05-4

Isomer Groups

Name	CAS Number[1]	Name	CAS Number[1]
Anthraquinone[29]	*	Hexane[30]	*
Butane[29]	*	Hexene[29]	25264-93-1
Butene[29]	25167-67-3	Methylindan[29]	27133-93-3
Cycloheptane[29]	*	Nonane[29]	*
Cyclohexene[29]	*	Octane[29]	*
Cyclooctane[29]	*	Pentane[29]	*
Decane[29]	*	Pentene[29]	*
Dihydronapthalene[29]	*	Terpene[29]	68956-56-9
Dodecane[29]	*	Trimethylbenzene[31]	25551-13-7
Heptane[29]	*	Xylene[29]	1330-20-7

Other Groups and Mixtures

Name	CAS Number[1]	Name	CAS Number[1]
Creosote	8001-58-9	Mineral spirits	64475-85-0
Heavy aromatic solvent naphtha	64742-94-5	Naphtha	8030-30-6
Light aromatic solvent naphtha	64742-95-6	Stoddard solvent	8052-41-3

29 "all isomers."
30 "all isomers," excluding *n*-hexane (CAS No. 110-54-3).
31 "all isomers," excluding 1,2,4-trimethylbenzene (CAS No. 95-63-6

Appendix 2 – NPRI Substances for 2004, Listed by Chemical Abstracts Service (CAS) Registry Number

Explanations of the footnotes and substance qualifiers are provided in Step 1.

Part 1A Substances

CAS No.[1]	Name	CAS No.[1]	Name
*	Ammonia (total) [2]	75-44-5	Phosgene
*	Antimony [3]	75-45-6	HCFC-22
*	Chromium [4]	75-56-9	Propylene oxide
*	Cobalt [3]	75-63-8	Halon 1301
*	Copper [3]	75-65-0	*tert*-Butyl alcohol
*	Cyanides [5]	75-68-3	HCFC-142b
*	Manganese [3]	75-69-4	CFC-11
*	Nickel [3]	75-71-8	CFC-12
*	Nitrate ion [6]	75-72-9	CFC-13
*	Nonylphenol and its ethoxylates [7]	76-01-7	Pentachloroethane
*	Octylphenol and its ethoxylates [8]	76-14-2	CFC-114
*	Phosphorus (total) [9]	76-15-3	CFC-115
*	Selenium [3]	77-47-4	Hexachlorocyclopentadiene
*	Silver [3]	77-73-6	Dicyclopentadiene
*	Zinc [3]	77-78-1	Dimethyl sulphate
50-00-0	Formaldehyde	78-79-5	Isoprene
55-63-0	Nitroglycerin	78-83-1	i-Butyl alcohol
56-23-5	Carbon tetrachloride	78-84-2	Isobutyraldehyde
62-53-3	Aniline [10]	78-87-5	1,2-Dichloropropane
62-56-6	Thiourea	78-92-2	sec-Butyl alcohol
64-18-6	Formic acid	78-93-3	Methyl ethyl ketone
64-67-5	Diethyl sulphate	79-00-5	1,1,2-Trichloroethane
64-75-5	Tetracycline hydrochloride	79-01-6	Trichloroethylene
67-56-1	Methanol	79-06-1	Acrylamide
67-63-0	Isopropyl alcohol	79-10-7	Acrylic acid [10]
67-66-3	Chloroform	79-11-8	Chloroacetic acid [10]
67-72-1	Hexachloroethane	79-21-0	Peracetic acid [10]
68-12-2	N,N-Dimethylformamide	79-34-5	1,1,2,2-Tetrachloroethane
70-30-4	Hexachlorophene	79-46-9	2-Nitropropane
71-36-3	*n*-Butyl alcohol	80-05-7	*p,p'*-Isopropylidenediphenol
71-43-2	Benzene	80-15-9	Cumene hydroperoxide
74-83-9	Bromomethane	80-62-6	Methyl methacrylate
74-85-1	Ethylene	81-88-9	C.I. Food Red 15
74-87-3	Chloromethane	84-66-2	Diethyl phthalate
74-88-4	Methyl iodide	84-74-2	Dibutyl phthalate
74-90-8	Hydrogen cyanide	85-44-9	Phthalic anhydride
75-00-3	Chloroethane	85-68-7	Butyl benzyl phthalate
75-01-4	Vinyl chloride	86-30-6	N-Nitrosodiphenylamine
75-05-8	Acetonitrile	90-43-7	*o*-Phenylphenol [10]
75-07-0	Acetaldehyde	90-94-8	Michler's ketone [10]
75-09-2	Dichloromethane	91-08-7	Toluene-2,6-diisocyanate
75-15-0	Carbon disulphide	91-20-3	Naphthalene
75-21-8	Ethylene oxide	91-22-5	Quinoline [10]
75-35-4	Vinylidene chloride	92-52-4	Biphenyl

Part 1A Substances

CAS No.[1]	Name
94-36-0	Benzoyl peroxide
94-59-7	Safrole
95-50-1	*o*-Dichlorobenzene
95-63-6	1,2,4-Trimethylbenzene
95-80-7	2,4-Diaminotoluene [10]
96-09-3	Styrene oxide
96-33-3	Methyl acrylate
96-45-7	Ethylene thiourea
98-82-8	Cumene
98-86-2	Acetophenone
98-88-4	Benzoyl chloride
98-95-3	Nitrobenzene
100-01-6	*p*-Nitroaniline
100-02-7	*p*-Nitrophenol [10]
100-41-4	Ethylbenzene
100-42-5	Styrene
100-44-7	Benzyl chloride
101-14-4	*p,p'*-Methylene*bis*(2-chloroaniline)
101-68-8	Methylene*bis*(phenylisocyanate)
101-77-9	*p,p'*-Methylenedianiline
103-23-1	*Bis*(2-ethylhexyl) adipate
106-46-7	*p*-Dichlorobenzene
106-50-3	*p*-Phenylenediamine [10]
106-51-4	*p*-Quinone
106-88-7	1,2-Butylene oxide
106-89-8	Epichlorohydrin
106-99-0	1,3-Butadiene
107-02-8	Acrolein
107-04-0	1-Bromo-2-chloroethane
107-05-1	Allyl chloride
107-06-2	1,2-Dichloroethane
107-13-1	Acrylonitrile
107-18-6	Allyl alcohol
107-19-7	Propargyl alcohol
107-21-1	Ethylene glycol
108-05-4	Vinyl acetate
108-10-1	Methyl isobutyl ketone
108-31-6	Maleic anhydride
108-88-3	Toluene
108-90-7	Chlorobenzene
108-93-0	Cyclohexanol
108-95-2	Phenol [10]
109-06-8	2-Methylpyridine
109-86-4	2-Methoxyethanol
110-49-6	2-Methoxyethyl acetate
110-54-3	*n*-Hexane
110-80-5	2-Ethoxyethanol
110-82-7	Cyclohexane
110-86-1	Pyridine [10]
111-15-9	2-Ethoxyethyl acetate
111-42-2	Diethanolamine [10]
111-76-2	2-Butoxyethanol
115-07-1	Propylene
115-28-6	Chlorendic acid
117-81-7	*Bis*(2-ethylhexyl) phthalate
117-84-0	Di-n-octyl phthalate
120-12-7	Anthracene
120-58-1	Isosafrole
120-80-9	Catechol
120-82-1	1,2,4-Trichlorobenzene
120-83-2	2,4-Dichlorophenol [10]
121-14-2	2,4-Dinitrotoluene
121-44-8	Triethylamine
121-69-7	N,N-Dimethylaniline [10]
122-39-4	Diphenylamine
123-31-9	Hydroquinone [10]
123-38-6	Propionaldehyde
123-63-7	Paraldehyde
123-72-8	Butyraldehyde
123-91-1	1,4-Dioxane
124-40-3	Dimethylamine
127-18-4	Tetrachloroethylene
128-37-0	2,6-Di-*t*-butyl-4-methylphenol
131-11-3	Dimethyl phthalate
139-13-9	Nitrilotriacetic acid [10]
140-88-5	Ethyl acrylate
141-32-2	Butyl acrylate
149-30-4	2-Mercaptobenzothiazole
156-62-7	Calcium cyanamide
302-01-2	Hydrazine [10]
353-59-3	Halon 1211
463-58-1	Carbonyl sulphide
534-52-1	4,6-Dinitro-o-cresol [10]
541-41-3	Ethyl chloroformate
542-76-7	3-Chloropropionitrile
554-13-2	Lithium carbonate
563-47-3	3-Chloro-2-methyl-1-propene
569-64-2	C.I. Basic Green 4
584-84-9	Toluene-2,4-diisocyanate
606-20-2	2,6-Dinitrotoluene
612-83-9	3,3'-Dichlorobenzidine dihydrochloride
630-20-6	1,1,1,2-Tetrachloroethane
842-07-9	C.I. Solvent Yellow 14
872-50-4	N-Methyl-2-pyrrolidone
924-42-5	N-Methylolacrylamide
989-38-8	C.I. Basic Red 1
1163-19-5	Decabromodiphenyl oxide
1300-71-6	Dimethyl phenol
1313-27-5	Molybdenum trioxide
1314-20-1	Thorium dioxide
1319-77-3	Cresol [10,11]
1330-20-7	Xylene [12]

Part 1A Substances

CAS No.[1]	Name	CAS No.[1]	Name
1332-21-4	Asbestos [13]	7726-95-6	Bromine
1344-28-1	Aluminum oxide [14]	7758-01-2	Potassium bromate
1634-04-4	Methyl *tert*-butyl ether	7782-41-4	Fluorine
1717-00-6	HCFC-141b	7782-50-5	Chlorine
2551-62-4	Sulphur hexafluoride	7783-06-4	Hydrogen sulphide
2832-40-8	C.I. Disperse Yellow 3	7789-75-5	Calcium fluoride
3118-97-6	C.I. Solvent Orange 7	9016-87-9	Polymeric diphenylmethane diisocyanate
4098-71-9	Isophorone diisocyanate		
4170-30-3	Crotonaldehyde	10049-04-4	Chlorine dioxide
4680-78-8	C.I. Acid Green 3	13463-40-6	Iron pentacarbonyl
5124-30-1	1,1-Methylene*bis* (4-isocyanatocyclohexane)	15646-96-5	2,4,4-Trimethylhexamethylene diisocyanate
7429-90-5	Aluminum [15]	16938-22-0	2,2,4-Trimethylhexamethylene diisocyanate
7440-62-2	Vanadium [16]		
7550-45-0	Titanium tetrachloride	25321-14-6	Dinitrotoluene [18]
7632-00-0	Sodium nitrite	26471-62-5	Toluenediisocyanate [18]
7637-07-2	Boron trifluoride	28407-37-6	C.I. Direct Blue 218
7647-01-0	Hydrochloric acid	34077-87-7	HCFC-123 and all isomers [19]
7664-39-3	Hydrogen fluoride	41834-16-6	HCFC-122 and all isomers [20]
7664-93-9	Sulphuric acid	63938-10-3	HCFC 124 and all isomers [21]
7681-49-4	Sodium fluoride	68920-70-7	Alkanes, C6-18, chloro
7697-37-2	Nitric acid	85535-84-8	Alkanes, C10-13, chloro
7723-14-0	Phosphorus [17]		

[See Step 1 for an explanation of these qualifiers.]

* No single CAS number applies to this NPRI listing.

1 CAS Registry Number denotes the Chemical Abstracts Service Registry Number, as appropriate.

2 "Ammonia (total)" means the total of both of ammonia (NH3 - CAS No. 7664-41-7) and the ammonium ion (NH4+) in solution.

3 "and its compounds"

4 "and its compounds" except hexavalent chromium compounds

5 "ionic"

6 "in solution at a pH of 6.0 or greater"

7 Includes nonylphenol, its ethoxylates and derivatives with CAS numbers: 104-40-5; 25154-52-3; 84852-15-3;
1323-65-5; 26523-78-4; 28987-17-9; 68081-86-7; 68515-89-9; 68515-93-5; 104-35-8; 20427-84-3;
26027-38-3; 27177-05-5; 27177-08-8; 28679-13-2; 27986-36-3; 37251-69-7; 7311-27-5; 9016-45-9;
27176-93-8; 37340-60-6; 51811-79-1; 51938-25-1; 68412-53-3; 9051-57-4; 37205-87-1; 68412-54-4;
127087-87-1.

8 Includes octylphenol and its ethoxylates with CAS numbers: 140-66-9; 1806-26-4; 27193-28-8; 68987-90-6;
9002-93-1; 9036-19-5.

9 Does not include phosphorus (yellow or white) with CAS No. 7723-14-0.

10 "and its salts" - The CAS number corresponds to the weak acid or base. However, the substance includes the salts
of these weak acids and bases. When calculating the weight of these substances and their salts, use the molecular
weight of the acid or base, not the total weight of the salt.

11 "all isomers" including the individual isomers of cresol: *m*-cresol (CAS No. 108-39-4), *o*-cresol (CAS No. 95-48-7) and *p*-cresol (CAS No. 106-44-5)
12 "all isomers" including the individual isomers of xylene: *m*-xylene (CAS No. 108-38-3), *o*-xylene (CAS No. 95-47-6) and *p*-xylene (CAS No. 106-42-3).
13 "friable form"
14 "fibrous forms"
15 "fume or dust"
16 "(except when in an alloy) and its compounds"
17 "yellow or white"
18 "mixed isomers"
19 "all isomers" including, but not limited to, HCFC-123 (CAS No. 306-83-2) and HCFC 123a (CAS No. 90454-18-5).
20 "all isomers" including, but not limited to, HCFC-122 (CAS No. 354-21-2).
21 "all isomers" including, but not limited to, HCFC 124 (CAS No. 2837-89-0), and HCFC 124a (CAS No. 354-25-6).

Part 1B Substances

CAS No.[1]	Name	CAS No.[1]	Name
•	Mercury [3]	•	Hexavalent chromium compounds
•	Cadmium [3]	•	Lead [22, 23]
•	Arsenic [3]	78-00-2	Tetraethyl lead

22 "and its compounds" except tetraethyl lead
23 Does not include lead (and its compounds) contained in stainless steel, brass or bronze alloys

Part 2 Substances

CAS No.[1]	Name	CAS No.[1]	Name
50-32-8	Benzo(a)pyrene	194-59-2	7H-Dibenzo(c,g)carbazole
53-70-3	Dibenzo(a,h)anthracene	198-55-0	Perylene
56-55-3	Benzo(a)anthracene	205-82-3	Benzo(j)fluoranthene
85-01-8	Phenanthrene	205-99-2	Benzo(b)fluoranthene
129-00-0	Pyrene	206-44-0	Fluoranthene
189-55-9	Dibenzo(a,i)pyrene	207-08-9	Benzo(k)fluoranthene
191-24-2	Benzo(g,h,i)perylene	218-01-9	Benzo(a)phenanthrene
192-97-2	Benzo(e)pyrene	224-42-0	Dibenz(a,j)acridine
193-39-5	Indeno(1,2,3-c,d)pyrene		

Part 3 Substances

CAS No.[1]	Name	CAS No.[1]	Name
•	Dioxins and Furans [24]		
118-74-1	Hexachlorobenzene		

[See Steps 1 and 2 for an explanation of this footnote.]

24 This class of substances is restricted to the following congeners:
2,3,7,8-Tetrachlorodibenzo-p-dioxin (1746-01-6);
1,2,3,7,8-Pentachlorodibenzo-p-dioxin (40321-76-4);
1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin (39227-28-6);
1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin (19408-74-3);
1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin (57653-85-7);
1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin (35822-46-9);
Octachlorodibenzo-p-dioxin (3268-87-9);
2,3,7,8-Tetrachlorodibenzofuran (51207-31-9);
2,3,4,7,8-Pentachlorodibenzofuran (57117-31-4);
1,2,3,7,8-Pentachlorodibenzofuran (57117-41-6);
1,2,3,4,7,8-Hexachlorodibenzofuran (70648-26-9);
1,2,3,7,8,9-Hexachlorodibenzofuran (72918-21-9);
1,2,3,6,7,8-Hexachlorodibenzofuran (57117-44-9);
2,3,4,6,7,8-Hexachlorodibenzofuran (60851-34-5);
1,2,3,4,6,7,8-Heptachlorodibenzofuran (67562-39-4);
1,2,3,4,7,8,9-Heptachlorodibenzofuran (55673-89-7); and
Octachlorodibenzofuran (39001-02-0).

Part 4 Substances

CAS No.[1]	Name	CAS No.[1]	Name
•	$PM_{2.5}$ [25]	630-08-0	Carbon monoxide
•	PM_{10} [26]	7446-09-5	Sulphur dioxide
•	Total particulate matter [27]	11104-93-1	Oxides of nitrogen (expressed as NO_2)
•	Volatile organic compounds [28]		

25 means any particulate matter with a diameter less than or equal to 2.5 microns.
26 means any particulate matter with a diameter less than or equal to 10 microns.
27 means any particulate matter with a diameter less than 100 microns.
28 Refer to Appendix 5 for definition of VOCs.

Part 5 Substances

Individual Substances

CAS No.[1]	Name	CAS No.[1]	Name
50-00-0	Formaldehyde	108-05-4	Vinyl acetate
64-17-5	Ethyl alcohol	108-10-1	Methyl isobutyl ketone
65-53-3	Aniline [10]	108-88-3	Toluene
67-56-1	Methanol	108-90-7	Chlorobenzene
67-63-0	Isopropyl alcohol	110-54-3	*n*-Hexane
71-43-2	Benzene	111-76-2	2-Butoxyethanol
74-85-1	Ethylene	115-07-1	Propylene
74-86-2	Acetylene	115-10-6	Dimethylether
74-98-6	Propane	123-35-3	Myrcene
78-93-3	Methyl ethyl ketone	123-86-4	*n*-Butyl acetate
80-56-8	Alpha-Pinene	124-04-9	Adipic acid
95-63-6	1,2,4-Trimethylbenzene	127-91-3	Beta-Pinene
100-42-5	Styrene	141-78-6	Ethyl acetate
103-71-9	Phenyl isocyanate	420-56-4	Trimethylfluorosilane
106-46-7	*p*-Dichlorobenzene	555-10-2	Beta-Phellandrene
106-99-0	1,3-Butadiene	5989-27-5	D-Limonene
107-06-2	1,2-Dichloroethane	7379-12-6	2-Methyl-3-hexanone

Isomer Groups

CAS No.[1]	Name	CAS No.[1]	Name
*	Anthraquinone [29]	*	Nonane [29]
*	Butane [29]	*	Octane [29]
*	Cycloheptane [29]	*	Pentane [29]
*	Cyclohexene [29]	*	Pentene [29]
*	Cyclooctane [29]	1330-20-7	Xylene [29]
*	Decane [29]	25167-67-3	Butene [29]
*	Dihydronapthalene [29]	25264-93-1	Hexene [29]
*	Dodecane [29]	25551-13-7	Trimethylbenzene [31]
*	Heptane [29]	27133-93-3	Methylindan [29]
*	Hexane [30]	68956-56-9	Terpene [29]

Other Groups and Mixtures

CAS No.[1]	Name	CAS No.[1]	Name
8001-58-9	Creosote	64475-85-0	Mineral spirits
8030-30-6	Naphtha	64742-94-5	Heavy aromatic solvent naphtha
8052-41-3	Stoddard solvent	64742-95-6	Light aromatic solvent naphtha

29 "all isomers."
30 "all isomers", excluding n-hexane (CAS No. 110-54-3).
31 "all isomers", excluding 1,2,4-trimethylbenzene (CAS No. 95-63-6).

Appendix 3 – Definition of Biomedical Waste

The following definition has been taken from the 1992 Canadian Council of Ministers of the Environment's *Guidelines for the Management of Biomedical Waste in Canada.*

Definition

This definition does not apply to microbiology laboratory waste, human blood and body fluid waste or waste sharps after these wastes have been disinfected or decontaminated.

Biomedical waste refers to waste that is generated by:

- human or animal health-care facilities,
- medical or veterinary research and teaching establishments,
- health care teaching establishments,
- clinical testing or research laboratories, and
- facilities involved in the production or testing of vaccines.

The following are the types of biomedical waste:

a) **Human Anatomical Waste**
This consists of human tissues, organs and body parts, but does not include teeth, hair and nails.

b) **Animal Waste**
This consists of all animal tissues, organs, body parts, carcasses, bedding, fluid blood and blood products, items saturated or dripping with blood, body fluids contaminated with blood, and body fluids removed for diagnosis or removed during surgery, treatment or autopsy, unless a trained person has certified that the waste does not contain the viruses and agents listed in Risk Group 4 of the *Guidelines.* This excludes teeth, hair, nails, hooves and feathers.

c) **Microbiology Laboratory Waste**
This consists of laboratory cultures, stocks or specimens of microorganisms, live or attenuated vaccines, human or animal cell cultures used in research, and laboratory material that has come into contact with any of these.

d) **Human Blood and Body Fluid Waste**
This consists of human fluid blood and blood products, items saturated or dripping with blood, body fluids contaminated with blood and body fluids removed for diagnosis during surgery, treatment or autopsy. This does not include urine or feces.

e) **Waste Sharps**
Waste sharps are clinical and laboratory materials consisting of needles, syringes, blades or laboratory glass capable of causing punctures or cuts.

Biomedical waste does not include waste that is:

- from animal husbandry,
- household in origin,
- controlled in accordance with the *Health of Animals Act* (Canada), formerly the *Animal Disease Protection Act* (Canada), or
- generated in the food production, general building maintenance and office administration activities of those facilities to which this definition applies.

Appendix 4 – Definition of Hazardous Waste

Cooperative efforts by federal and provincial environment departments and members of industry have led to the development of the following working definition of hazardous waste:

Hazardous wastes are those wastes that are potentially hazardous to human health and/or the environment due to their nature and quantity, and that require special handling techniques.

According to the *Export and Import of Hazardous Waste Regulations* (EIHW), *hazardous waste* means a product, substance or organism that is intended for disposal or recycling, including storage prior to disposal or recycling, and that is:

(a) listed in Schedule III of the *EIHW Regulations*; or

(b) included in any of classes 2 to 6 and 8 and 9 of the *Transportation of Dangerous Goods Regulations*, except a product, substance or organism that is:
   (i) household in origin; or
   (ii) returned directly to its manufacturer or supplier for reprocessing, repackaging or resale, including a product, substance or organism that is:
      (A) defective or otherwise not usable for its original purpose; or
      (B) in surplus quantities but still usable for its original purpose.

More information on the *EIHW Regulations* can be found on the Web site <www.ec.gc.ca/CEPARegistry/regulations/>.

Information on the *TDG Regulations* can be found on the Web site <www.tc.gc.ca/acts-regulations/tdg/tdg1/part_1.htm>.

Appendix 5 – Definition of VOC

The definition for volatile organic compounds (VOC) comes from the *Order adding toxic substances to Schedule 1 to the Canadian Environmental Protection Act*, 1999, section 1, published in the *Canada Gazette*, Part II, July 2, 2003.

Note: This definition excludes substances from consideration, but does not directly name substances that are VOCs. Section 3.8 explains VOCs in greater detail. The substances listed below *are not* to be considered in calculating VOC for the purposes of NPRI reporting.

Definition of VOC

Volatile organic compounds that participate in atmospheric photochemical reactions, **excluding** the following:

Substances not considered VOC

Name of substance or group of substances	CAS Number
(a) methane	74-82-8
(b) ethane	74-84-0
(c) methylene chloride (dichloromethane)	75-09-2
(d) 1,1,1-trichloroethane (methyl chloroform)	71-55-6
(e) 1,1,2-trichloro-1,2,2-trifluoroethane (CFC-113)	76-13-1
(f) trichlorofluoromethane (CFC-11)	75-69-4
(g) dichlorodifluoromethane (CFC-12)	75-71-8
(h) chlorodifluoromethane (HCFC-22)	75-45-6
(i) trifluoromethane (HFC-23)	75-46-7
(j) 1,2-dichloro-1,1,2,2-tetrafluoroethane (CFC-114)	76-14-2
(k) chloropentafluoroethane (CFC-115)	76-15-3
(l) 1,1,1-trifluoro-2,2-dichloroethane (HCFC-123)	306-83-2
(m) 1,1,1,2-tetrafluoroethane (HFC-134a)	811-97-2
(n) 1,1-dichloro-1-fluoroethane (HCFC-141b)	1717-00-6
(o) 1-chloro-1,1-difluoroethane (HCFC-142b)	75-68-3
(p) 2-chloro-1,1,1,2-tetrafluoroethane (HCFC-124)	2837-89-0
(q) pentafluoroethane (HFC-125)	354-33-6
(r) 1,1,2,2-tetrafluoroethane (HFC-134)	359-35-3
(s) 1,1,1-trifluoroethane (HFC-143a)	420-46-2
(t) 1,1-difluoroethane (HFC-152a)	75-37-6
(u) parachlorobenzotrifluoride (PCBTF)	98-56-6
(v) cyclic, branched, or linear completely methylated siloxanes	various
(w) acetone	67-64-1
(x) perchloroethylene (tetrachloroethylene)	127-18-4
(y) 3,3-dichloro-1,1,1,2,2-pentafluoropropane (HCFC-225ca)	422-56-0
(z) 1,3-dichloro-1,1,2,2,3-pentafluoropropane (HCFC-225cb)	507-55-1
(z.1) 1,1,1,2,3,4,4,5,5,5-decafluoropentane (HFC-43-10mee)	138495-42-8
(z.2) difluoromethane (HFC-32)	75-10-5
(z.3) ethylfluoride (HFC-161)	353-36-6

(z.4) 1,1,1,3,3,3-hexafluoropropane (HFC-236fa)	690-39-1
(z.5) 1,1,2,2,3-pentafluoropropane (HFC-245ca)	679-86-7
(z.6) 1,1,2,3,3-pentafluoropropane (HFC-245ea)	24270-66-4
(z.7) 1,1,1,2,3-pentafluoropropane (HFC-245eb)	431-31-2
(z.8) 1,1,1,3,3-pentafluoropropane (HFC-245fa)	460-73-1
(z.9) 1,1,1,2,3,3-hexafluoropropane (HFC-236ea)	431-63-0
(z.10) 1,1,1,3,3-pentafluorobutane (HFC-365mfc)	406-58-6
(z.11) chlorofluoromethane (HCFC-31)	593-70-4
(z.12) 1-chloro-1-fluoroethane (HCFC-151a)	1615-75-4
(z.13) 1,2-dichloro-1,1,2-trifluoroethane (HCFC-123a)	354-23-4
(z.14) 1,1,1,2,2,3,3,4,4-nonafluoro-4-methoxy-butane ($C_4F_9OCH_3$)	163702-07-6
(z.15) (difluoromethoxymethyl)-1,1,1,2,3,3,3-heptafluoropropane ($(CF_3)_2CFCF_2OCH_3$)	163702-08-7
(z.16) 1-ethoxy-1,1,2,2,3,3,4,4,4-nonafluorobutane ($C_4F_9OC_2H_5$)	163702-05-4
(z.17) (ethoxydifluoromethyl)-1,1,1,2,3,3,3-heptafluoropropane ($(CF_3)_2CFCF_2OC_2H_5$)	163702-06-5
(z.18) methyl acetate	79-20-9
perfluorocarbon compounds that fall into these classes:	
(i) cyclic, branched or linear, completely fluorinated alkanes	various
(ii) cyclic, branched or linear, completely fluorinated ethers with no unsaturations	various
(iii) cyclic, branched or linear, completely fluorinated tertiary amines with no unsaturations, and	various
(iv) sulphur containing perfluorocarbons with no unsaturations and with sulphur bonds only to carbon and fluorine.	various

Appendix 6 – Storage Tanks and Their Evaporation Implications

Fixed-roof Tanks

This type of tank consists of a cylindrical steel shell with a permanently affixed roof, varying in design from cone- or dome-shaped to flat. Losses from fixed-roof tanks are caused by changes in temperature, pressure and liquid level.

Of current tank designs, the fixed-roof tank is the least expensive to construct and is generally considered the minimum acceptable equipment for storing organic liquids.

Horizontal fixed-roof tanks are constructed for both above-ground and underground service and are usually built of steel, steel with a fiberglass overlay or fiberglass-reinforced polyester. They are usually equipped with pressure-vacuum vents, gauge hatches, sample wells and access points. In addition, underground tanks may be cathodically protected to prevent corrosion of the tank shell. Their capacity is generally less than 150 000 litres.

The potential emission sources for above-ground horizontal tanks are the same as those for vertical fixed-roof tanks. Emissions from underground storage tanks are associated mainly with changes in the liquid level in the tank. Losses caused by changes in temperature or barometric pressure are minimal for underground tanks, because the surrounding earth limits diurnal temperature change; changes in barometric pressure result in only small losses.

Emissions:

The two significant types of emissions from fixed-roof tanks are storage and working losses. *Storage loss* is the expulsion of vapour from a tank through vapour expansion and contraction, which is the result of changes in temperature and barometric pressure. This loss occurs without any change in the liquid level in the tank.

The combined loss from filling and emptying is called *working loss*. Evaporation during filling operations is a result of an increase in the liquid level in the tank. As the liquid level increases, the pressure inside the tank exceeds the relief pressure and vapours are expelled from the tank. Evaporative loss during emptying occurs when air drawn into the tank during liquid removal becomes saturated with organic vapour and expands, thus exceeding the capacity of the vapour space.

Several methods are used to control emissions from fixed-roof tanks. They can be controlled by installing an internal floating roof and seals to minimize evaporation of the product being stored.

Vapour balancing is another means of emission control, and is probably most common in the filling of tanks at gasoline stations. As the storage tank is filled, the vapours expelled are directed to the emptying gasoline tanker truck. The truck then transports the vapours to a central station where a vapour recovery or control system is used to control emissions.

Vapour-recovery systems collect emissions from storage vessels and convert them to liquid product. Several vapour-recovery procedures may be used, including vapour/liquid absorption, vapour compression, vapour cooling, vapour/solid adsorption, or a combination of these.

Floating-roof Tanks

External Floating-roof Tanks:

A typical external floating-roof tank consists of an open-topped cylindrical steel shell equipped with a roof that floats on the surface of the stored liquid. The floating roof consists of a deck, fittings and rim seal system. Floating decks currently in use are constructed of welded steel plate and are of two general types – pontoon and double-deck. With all types of external floating-roof tanks, the roof rises and falls with the liquid level in the tank. External floating decks are equipped with a rim seal system attached to the deck perimeter and in contact with the tank wall. The purpose of the floating roof and rim seal system is to reduce evaporative loss of the stored liquid. Some annular space remains between the seal system and the tank wall. The seal system slides against the tank wall as the roof is raised and lowered. The floating deck is also equipped with fittings that penetrate the deck and serve operational functions. The external floating-roof design is such that evaporative losses from the stored liquid are limited to losses from the rim seal system and deck fittings (standing storage loss) and any exposed liquid on the tank walls (withdrawal loss).

Internal Floating-roof Tanks:

An internal floating-roof tank has both a permanent fixed roof and a floating roof inside. There are two basic types of internal floating-roof tank – tanks in which the fixed roof is supported by vertical columns within the tank, and tanks with a self-supporting fixed roof and no internal support columns. Fixed-roof tanks that have been retrofitted to use a floating roof are typically of the first type. External floating-roof tanks that have been converted to internal floating-roof tanks typically have a self-supporting roof. Newly-constructed internal floating-roof tanks may be of either type. The deck in internal floating-roof tanks rises and falls with the liquid level and either floats directly on the liquid surface (contact deck) or rests on pontoons several inches above the liquid surface (non-contact deck).

Non-contact decks are the most common type currently in use. Typical non-contact decks are constructed of an aluminum deck and an aluminum grid framework supported above the liquid surface by tubular aluminum pontoons or some other buoyant structure. Evaporative losses from floating roofs may come from deck fittings, non-welded deck seams and the annular space between the deck and tank wall. In addition, these tanks are freely vented by circulation vents at the top of the fixed roof. The vents minimize the possibility of organic vapour accumulation in the tank vapour space in concentrations approaching the flammable range.

Domed External Floating-roof Tanks:

Domed external (or covered) floating-roof tanks have the heavier type of deck used in external floating-roof tanks, as well as a fixed roof at the top of the shell-like internal floating-roof tanks. Domed external floating-roof tanks usually result from retrofitting an external floating-roof tank with a fixed roof. This type of tank is similar to an internal floating-roof tank with a welded deck and self-supporting fixed roof.

As with the internal floating-roof tanks, a fixed roof's function is not to act as a vapour barrier, but to block the wind. The type of fixed roof most commonly used is a self-supporting aluminum dome roof, which is of bolted construction. Like the internal floating-roof tanks, these tanks are freely vented by circulation vents at the top of the fixed roof.

Emissions:

Total emissions from floating-roof tanks are the sum of withdrawal losses and standing storage losses. Withdrawal losses occur as the liquid level, and thus the floating roof, is lowered. Some liquid remains on the inner tank wall surface and evaporates. For an internal floating-roof tank that has a column supported fixed roof, some liquid also clings to the columns and evaporates. Evaporative loss occurs until the tank is filled and the exposed surfaces are again covered. Standing storage losses from floating-roof tanks include

rim seal and deck fitting losses, and for internal floating-roof tanks also include deck seam losses for constructions other than welded decks. Other potential standing storage loss mechanisms include breathing losses as a result of temperature and pressure changes.

Variable Vapour Space Tanks

Variable vapour space tanks are equipped with expandable vapour reservoirs to accommodate vapour volume fluctuations attributable to temperature and barometric pressure changes. Although variable vapour space tanks are sometimes used independently, they are normally connected to the vapour spaces of one or more fixed-roof tanks. The two most common types of variable vapour space tanks are lifter roof tanks and flexible diaphragm tanks. Lifter roof tanks have a telescoping roof that fits loosely around the outside of the main tank wall. The space between the roof and the wall is closed by either a wet seal, which is a trough filled with liquid, or a dry seal, which uses a flexible coated fabric. Flexible diaphragm tanks use flexible membranes to provide expandable volume. They may be either separate gas holder units or integral units mounted atop fixed-roof tanks. Variable vapour space tank losses occur during tank filling when vapour is displaced by liquid. Loss of vapour occurs only when the tank's vapour storage capacity is exceeded.

Pressure Tanks

Two classes of pressure tanks are in general use – low pressure (2.5 to 15 psig) and high pressure (higher than 15 psig). Pressure tanks are generally used for storing organic liquids and gases with high vapour pressures, and are found in many sizes and shapes, depending on the operating pressure of the tank. Pressure tanks are equipped with a pressure/vacuum vent set to prevent venting loss from boiling and breathing loss from temperature or barometric pressure changes. High-pressure storage tanks can be operated so that virtually no evaporative or working losses occur. In low-pressure tanks, working losses can occur with atmospheric venting of the tank during filling operations. No appropriate correlations are available to estimate vapour losses from pressure tanks.

Appendix 7 – Data Requirements for Regional Air Quality Modelling

This appendix explains the data requirements for CAC regional air-quality models, and how that information will be collected through NPRI. Refer to the *NPRI Software Guide* for a description of the fields in the facility and substance sections of the reporting form for CAC.

What Is a Regional Air Quality Model?

A regional air-quality model (RAQM) is a time-dependent mathematical model of air-quality processes in the atmosphere. RAQMs use equations and relationships to simulate/describe the set of atmospheric dynamic, physical and chemical processes that govern air quality. Air-quality models are "prognostic" in that they attempt to simulate the changing air-quality conditions that would occur naturally for a given set of time dependent pollutant emissions and meteorological conditions.

Operating Schedule (Temporal Variation)

Information on temporal variation of emissions of CACs from individual facilities is required for RAQMs to represent the physical and chemical processes that occur over a given time and their impacts on concentrations and transport of these substances.

The quantity and concentration of emissions fluctuates over time at a facility as a result of its operation schedules, which include considerations such as changes in level of operations, shutdowns for routine maintenance and periods of operation. The quantity and concentration of the emissions may also fluctuate because of changes in process throughputs.

While information on temporal variation of actual CAC emissions is ideal for modelling purposes, a general description of the operating schedule of the facility is simpler to report to the NPRI, and will still meet the input needs for most air-quality models.

The thresholds for CAC are based on the quantity released to air. Once a threshold is met, only quantities of CAC released to air will be reported. CAC substances are of concern because they contribute to air pollution; therefore Environment Canada does not require information on releases to other media, nor on disposals or transfers for recycling.

Emissions from Stacks Greater Than 50 Metres Above Grade

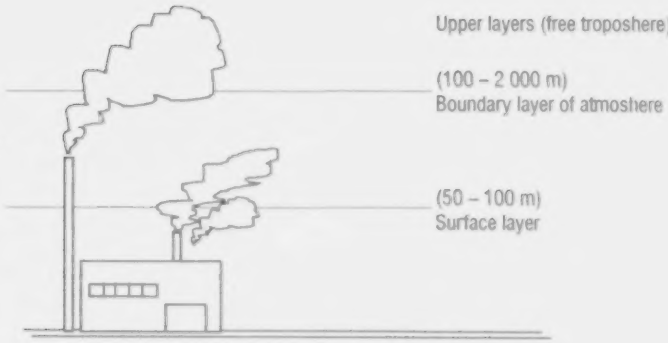
The majority of pollutant emissions are essentially at ground level or within the boundary layer (see diagram below). Pollutants within the boundary layer are usually dispersed/mixed quickly as a result of boundary-layer turbulence, whereas pollutants reaching the free troposphere are dispersed more slowly because of greater vertical stability and lower turbulence intensity. Of particular interest to modellers are CAC emissions from stacks that reach the upper layers of the atmosphere, where the pollutants experience a different transport, diffusion, temperature and chemical environment than in the atmospheric boundary layer. Complicating the situation is the change of boundary-layer depth that occurs with time of day, time of year and meteorological conditions. Some stacks may therefore emit into the boundary layer part of the time and into the free troposphere at other times.

Rather than require the facility to determine the plume rise from each stack and then report for those that enter the upper troposphere, Environment Canada performed analyses to select a stack height and quantity of CAC emissions likely to be significant for modelling purposes.

Specific to CAC substances only, NPRI requires reporting of CAC releases from stacks ≥ 50 metres above grade if the stack release threshold is met. The emission quantity of the CAC from the stack, together with the stack's physical parameters must be reported to NPRI.

Figure 11:

LAYERS OF ATMOSPHERE



Monthly Breakdown of Releases to Air

A monthly breakdown of annual emissions for each CAC that met the reporting threshold is required for regional air-quality modelling. Of particular importance are CAC emissions during the summer months, also known as smog season (May 1 – August 31), during which smog creates the greatest health risks.

Appendix 8 – Four-digit North American Industry Classification System (NAICS) Codes

11	**Agriculture, Forestry, Fishing & Hunting**
111	Crop Production
1111	Oilseed & Grain Farming
1112	Vegetable & Melon Farming
1113	Fruit & Tree Nut Farming
1114	Greenhouse, Nursery & Floriculture Production
1119	Other Crop Farming
112	Animal Production
1121	Cattle Ranching & Farming
1122	Hog & Pig Farming
1123	Poultry & Egg Production
1124	Sheep & Goat Farming
1125	Animal Aquaculture
1129	Other Animal Production
113	Forestry & Logging
1131	Timber Tract Operations
1132	Forest Nurseries & Gathering Forest Products
1133	Logging
114	Fishing, Hunting & Trapping
1141	Fishing
1142	Hunting & Trapping
115	Support Activities for Agriculture & Forestry
1151	Support Activities for Crop Production
1152	Support Activities for Animal Production
1153	Support Activities for Forestry
21	**Mining & Oil & Gas Extraction**
211	Oil & Gas Extraction
2111	Oil & Gas Extraction
212	Mining (exc. Oil & Gas)
2121	Coal Mining
2122	Metal Ore Mining
2123	Non-Metallic Mineral Mining & Quarrying
213	Support Act. – Mining & Oil & Gas Extraction
2131	Support Act. – Mining & Oil & Gas Extraction
22	**Utilities**
221	Utilities
2211	Electricity Generation, Transmission & Dist.
2212	Natural Gas Distribution
2213	Water, Sewage & Other Systems
23	**Construction**
231	Prime Contracting
2311	Land Subdivision & Land Development
2312	Building Construction
2313	Engineering Construction
2314	Construction Management
232	Trade Contracting
2321	Site Preparation Work
2322	Building Structure Work
2323	Building Exterior Finishing Work
2324	Building Interior Finishing Work
2325	Building Equipment Installation
2329	Other Special Trade Contracting
31–33	**Manufacturing**
311	Food Mfg.
3111	Animal Food Mfg.
3112	Grain & Oilseed Milling
3113	Sugar & Confectionery Product Mfg.
3114	Fruit & Veg. Preserving & Specialty Food Mfg.
3115	Dairy Product Mfg.
3116	Meat Product Mfg.
3117	Seafood Product Preparation & Packaging
3118	Bakeries & Tortilla Mfg.
3119	Other Food Mfg.
312	Beverage & Tobacco Product Mfg.
3121	Beverage Mfg.
3122	Tobacco Mfg.
313	Textile Mills
3131	Fibre, Yarn & Thread Mills
3132	Fabric Mills
3133	Textile & Fabric Finishing & Fabric Coating
314	Textile Product Mills
3141	Textile Furnishings Mills
3149	Other Textile Product Mills
315	Clothing Mfg.
3151	Clothing Knitting Mills
3152	Cut & Sew Clothing Mfg.
3159	Clothing Accessories & Other Clothing Mfg.
316	Leather & Allied Product Mfg.
3161	Leather & Hide Tanning & Finishing
3162	Footwear Mfg.
3169	Other Leather & Allied Product Mfg.
321	Wood Product Mfg.
3211	Sawmills & Wood Preservation
3212	Veneer, Plywood & Eng'rd Wood Product Mfg.
3219	Other Wood Product Mfg.
322	Paper Mfg.

3221	Pulp, Paper & Paperboard Mills
3222	Converted Paper Product Mfg.
323	Printing & Related Support Activities
3231	Printing & Related Support Activities
324	Petroleum & Coal Products Mfg.
3241	Petroleum & Coal Products Mfg.
325	Chemical Mfg.
3251	Basic Chemical Mfg.
3252	Resin, Synth. Rubber & Fibre & Filament Mfg.
3253	Pesticide, Fertilizer & Other Agr. Chem. Mfg.
3254	Pharmaceutical & Medicine Mfg.
3255	Paint, Coating & Adhesive Mfg.
3256	Soap, Cleaning Compound & Toilet Prep. Mfg.
3259	Other Chemical Product Mfg.
326	Plastics & Rubber Products Mfg.
3261	Plastic Product Mfg.
3262	Rubber Product Mfg.
327	Non-Metallic Mineral Product Mfg.
3271	Clay Product & Refractory Mfg.
3272	Glass & Glass Product Mfg.
3273	Cement & Concrete Product Mfg.
3274	Lime & Gypsum Product Mfg.
3279	Other Non-Metallic Mineral Product Mfg.
331	Primary Metal Mfg.
3311	Iron & Steel Mills & Ferro-Alloy Mfg.
3312	Steel Product Mfg. from Purchased Steel
3313	Alumina & Aluminum Production & Processing
3314	Non-Ferrous (exc. Al) Production & Processing
3315	Foundries
332	Fabricated Metal Product Mfg.
3321	Forging & Stamping
3322	Cutlery & Hand Tool Mfg.
3323	Architectural & Structural Metals Mfg.
3324	Boiler, Tank & Shipping Container Mfg.
3325	Hardware Mfg.
3326	Spring & Wire Product Mfg.
3327	Machine Shops, Turned Product & Related Mfg.
3328	Coating, Engraving & Heat Treating Activities
3329	Other Fabricated Metal Product Mfg.
333	Machinery Mfg.
3331	Agr., Construction & Mining Machinery Mfg.
3332	Industrial Machinery Mfg.
3333	Commercial & Service Industry Machinery Mfg.
3334	Ventilation, Heating, AC & Refrig. Equip. Mfg
3335	Metalworking Machinery Mfg.
3336	Engine, Turbine & Power Transmission Mfg.
3339	Other General-Purpose Machinery Mfg.
334	Computer & Electronic Product Mfg.
3341	Computer & Peripheral Equipment Mfg.
3342	Communications Equipment Mfg.
3343	Audio & Video Equipment Mfg.
3344	Semiconductor & Electronic Component Mfg.
3345	Instruments Mfg.
3346	Mfg. & Reproducing Magnetic & Optical Media
335	Electric Equip., Appliance & Component Mfg.
3351	Electric Lighting Equipment Mfg.
3352	Household Appliance Mfg.
3353	Electrical Equipment Mfg.
3359	Other Electrical Equipment & Component Mfg.
336	Transportation Equipment Mfg.
3361	Motor Vehicle Mfg.
3362	Motor Vehicle Body & Trailer Mfg.
3363	Motor Vehicle Parts Mfg.
3364	Aerospace Product & Parts Mfg.
3365	Railroad Rolling Stock Mfg.
3366	Ship & Boat Building
3369	Other Transportation Equipment Mfg.
337	Furniture & Related Product Mfg.
3371	Household & Inst. Furniture & Cabinet Mfg.
3372	Office Furniture (including Fixtures) Mfg.
3379	Other Furniture-Related Product Mfg.
339	Miscellaneous Mfg.
3391	Medical Equipment & Supplies Mfg.
3399	Other Miscellaneous Mfg.

41 Wholesale Trade

411	Farm Product Whl.
4111	Farm Product Whl.
412	Petroleum Product Whl.
4121	Petroleum Product Whl.
413	Food, Beverage & Tobacco Whl.
4131	Food Whl.
4132	Beverage Whl.
4133	Cigarette & Tobacco Product Whl.
414	Personal & Household Goods Whl.
4141	Textile, Clothing & Footwear Whl.
4142	Home Ent. Equip & Hhld. Appliance Whl.
4143	Home Furnishings Whl.
4144	Personal Goods Whl.
4145	Pharmaceuticals, Toiletries & Related Whl.
415	Motor Vehicle & Parts Whl.
4151	Motor Vehicle Whl.
4152	New Motor Vehicle Parts & Accessories Whl.

4153 Used Motor Vehicle Parts & Accessories Whl.
416 Building Material & Supplies Whl.
4161 Electrical, Plumbing, Heating & AC Equip. Whl
4162 Metal Service Centres
4163 Lumber & Other Building Supplies Whl.
417 Machinery, Equipment & Supplies Whl.
4171 Farm, Lawn & Garden Machinery & Equip. Whl.
4172 Construction, Forestry & Ind'l Machinery Whl.
4173 Computer & Communications Equipment Whl.
4179 Other Machinery, Equipment & Supplies Whl.
418 Miscellaneous Wholesaler-Distributors
4181 Recyclable Material Whl.
4182 Paper & Disposable Plastic Product Whl.
4183 Agricultural Supplies Whl.
4184 Chemical (exc. Agr.) & Allied Product Whl.
4189 Other Misc. Whl.
419 Wholesale Agents & Brokers
4191 Wholesale Agents & Brokers

44–45 Retail Trade

441 Motor Vehicle and Parts Dealers
4411 Automobile Dealers
4412 Other Motor Vehicle Dealers
4413 Automotive Parts, Accessories & Tire Stores
442 Furniture & Home Furnishings Stores
4421 Furniture Stores
4422 Home Furnishings Stores
443 Electronics & Appliance Stores
4431 Electronics & Appliance Stores
444 Building Material & Garden Equipment Dealers
4441 Building Material & Supplies Dealers
4442 Lawn & Garden Equipment & Supplies Stores
445 Food & Beverage Stores
4451 Grocery Stores
4452 Specialty Food Stores
4453 Beer, Wine & Liquor Stores
446 Health & Personal Care Stores
4461 Health & Personal Care Stores
447 Gasoline Stations
4471 Gasoline Stations
448 Clothing & Clothing Accessories Stores
4481 Clothing Stores
4482 Shoe Stores
4483 Jewellery, Luggage & Leather Goods Stores
451 Sporting Goods, Hobby, Book & Music Stores
4511 Sport, Hobby & Musical Instrument Stores
4512 Book, Periodical & Music Stores
452 General Merchandise Stores
4521 Department Stores
4529 Other General Merchandise Stores
453 Misc. Store Retailers
4531 Florists
4532 Office Supply, Stationery & Gift Stores
4533 Used Merchandise Stores
4539 Other Misc. Store Retailers
454 Non-Store Retailers
4541 Electronic Shopping & Mail-Order Houses
4542 Vending Machine Operators
4543 Direct Selling Establishments

48–49 Transportation and Warehousing

481 Air Transportation
4811 Scheduled Air Transportation
4812 Non-Scheduled Air Transportation
482 Rail Transportation
4821 Rail Transportation
483 Water Transportation
4831 Deep Water Transportation
4832 Inland Water Transportation
484 Truck Transportation
4841 General Freight Trucking
4842 Specialized Freight Trucking
485 Transit & Ground Passenger Transportation
4851 Urban Transit Systems
4852 Interurban & Rural Bus Transportation
4853 Taxi & Limousine Service
4854 School & Employee Bus Transportation
4855 Charter Bus Industry
4859 Other Transit & Ground Passenger Transport
486 Pipeline Transportation
4861 Pipeline Transportation of Crude Oil
4862 Pipeline Transportation of Natural Gas
4869 Other Pipeline Transportation
487 Scenic & Sightseeing Transportation
4871 Scenic & Sightseeing Transportation, Land
4872 Scenic & Sightseeing Transportation, Water
4879 Scenic & Sightseeing Transportation, Other
488 Support Activities for Transportation
4881 Support Activities for Air Transportation
4882 Support Activities for Rail Transportation
4883 Support Activities for Water Transportation
4884 Support Activities for Road Transportation
4885 Freight Transportation Arrangement
4889 Other Support Activities for Transportation
491 Postal Service
4911 Postal Service
492 Couriers & Messengers
4921 Couriers

4922 Local Messengers & Local Delivery
493 Warehousing & Storage
4931 Warehousing & Storage

51 Information & Cultural Industries

511 Publishing Industries
5111 Newspaper, Periodical, Book & DB Publishers
5112 Software Publishers
512 Motion Picture & Sound Recording Industries
5121 Motion Picture & Video Industries
5122 Sound Recording Industries
513 Broadcasting & Telecommunications
5131 Radio & Television Broadcasting
5132 Pay TV, Specialty TV & Program Distribution
5133 Telecommunications
514 Information & Data Processing Services
5141 Information Services
5142 Data Processing Services

52 Finance & Insurance

521 Monetary Authorities – Central Bank
5211 Monetary Authorities – Central Bank
522 Credit Intermediation & Related Activities
5221 Depository Credit Intermediation
5222 Non-Depository Credit Intermediation
5223 Activities Related to Credit Intermediation
523 Securities, Commodity Contracts & Related
5231 Securities & Commodity Contracts Intermed.
5232 Securities & Commodity Exchanges
5239 Other Financial Investment Activities
524 Insurance Carriers & Related Activities
5241 Insurance Carriers
5242 Agencies, Brokerages & Other Insurance Act.
526 Funds and Other Financial Vehicles
5261 Pension Funds
5269 Other Funds and Financial Vehicles

53 Real Estate & Rental & Leasing

531 Real Estate
5311 Lessors of Real Estate
5312 Offices of Real Estate Agents & Brokers
5313 Activities Related to Real Estate
532 Rental & Leasing Services
5321 Automotive Equipment Rental & Leasing
5322 Consumer Goods Rental
5323 General Rental Centres
5324 Commercial & Ind'l Machinery Rental & Leasing
533 Lessors of Non-Financial Intangible Assets
5331 Lessors of Non-Financial Intangible Assets

54 Professional, Scientific & Technical Services

541 Professional, Scientific & Technical Services
5411 Legal Services
5412 Accounting, Tax Prep. & Bookkeeping Services
5413 Architectural, Engineering & Related Services
5414 Specialized Design Services
5415 Computer Systems Design & Related Services
5416 Mgmt., Scientific & Technical Consulting Serv.
5417 Scientific R&D Services
5418 Advertising & Related Services
5419 Other Prof., Scientific & Technical Services

55 Management of Companies & Enterprises

551 Management of Companies & Enterprises
5511 Management of Companies & Enterprises

56 Admin., Support, Waste Mgmt & Remediation Services

561 Administrative & Support Services
5611 Office Administrative Services
5612 Facilities Support Services
5613 Employment Services
5614 Business Support Services
5615 Travel Arrangement & Reservation Services
5616 Investigation & Security Services
5617 Services to Buildings & Dwellings
5619 Other Support Services
562 Waste Management & Remediation Services
5621 Waste Collection
5622 Waste Treatment & Disposal
5629 Remediation & Other Waste Mgmt. Services

61 Educational Services

611 Educational Services
6111 Elementary & Secondary Schools
6112 Community Colleges & C.E.G.E.P.s
6113 Universities
6114 Business Schools & Computer & Mgmt. Training
6115 Technical & Trade Schools
6116 Other Schools & Instruction
6117 Educational Support Services

62 Health Care & Social Assistance

621 Ambulatory Health Care Services
6211 Offices of Physicians
6212 Offices of Dentists
6213 Offices of Other Health Practitioners
6214 Outpatient Care Centres
6215 Medical & Diagnostic Laboratories
6216 Home Health Care Services
6219 Other Ambulatory Health Care Services
622 Hospitals
6221 General Medical & Surgical Hospitals
6222 Psychiatric & Substance Abuse Hospitals
6223 Specialty (exc. Psych., etc.) Hospitals
623 Nursing & Residential Care Facilities
6231 Nursing Care Facilities
6232 Res. Developmental Handicap, etc., Facilities
6233 Community Care Facilities for the Elderly
6239 Other Residential Care Facilities
624 Social Assistance
6241 Individual & Family Services
6242 Community Food & Housing & Emerg., etc. Serv.
6243 Vocational Rehabilitation Services
6244 Child Day-Care Services

71 Arts, Entertainment & Recreation

711 Performing Arts, Spectator Sports & Related
7111 Performing Arts Companies
7112 Spectator Sports
7113 Promoters of Performing Arts, Sports, etc.
7114 Agents & Managers for Public Figures
7115 Independent Artists, Writers & Performers
712 Heritage Institutions
7121 Heritage Institutions
713 Amusement, Gambling & Recreation Industries
7131 Amusement Parks & Arcades
7132 Gambling Industries
7139 Other Amusement & Recreation Industries

72 Accommodation & Food Services

721 Accommodation Services
7211 Traveller Accommodation
7212 RV Parks & Recreational Camps
7213 Rooming & Boarding Houses
722 Food Services & Drinking Places
7221 Full-Service Restaurants
7222 Limited-Service Eating Places
7223 Special Food Services
7224 Drinking Places (Alcoholic Beverages)

81 Other Services (exc. Public Administration)

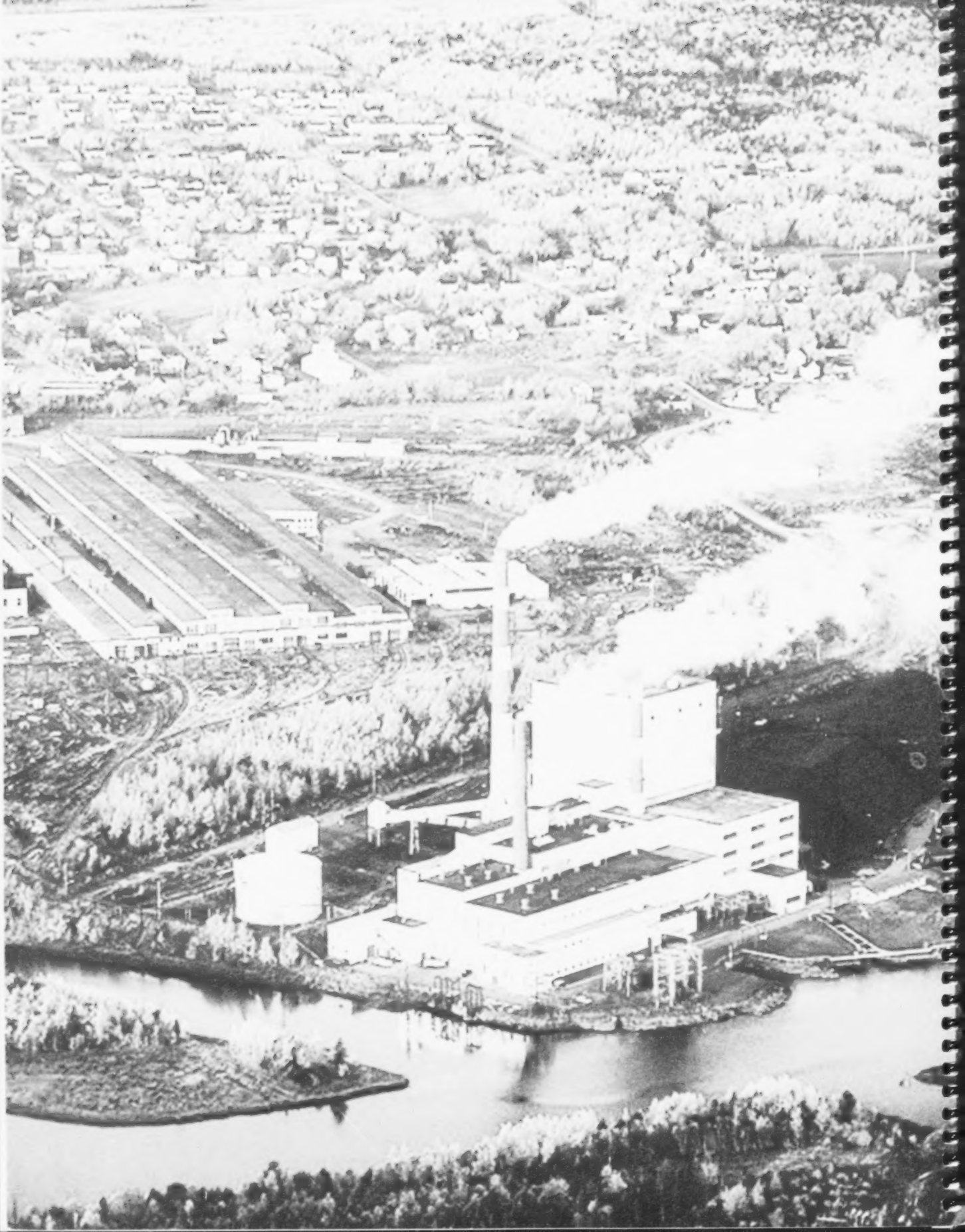
811 Repair and Maintenance
8111 Automotive R&M
8112 Electronic & Precision Equipment R&M
8113 Commercial & Ind'l Mach. & Equip. R&M
8114 Personal & Household Goods R&M
812 Personal & Laundry Services
8121 Personal Care Services
8122 Funeral Services
8123 Dry Cleaning and Laundry Services
8129 Other Personal Services
813 Religious, Grant-making, Civic & Similar Orgs.
8131 Religious Organizations
8132 Grant-making & Giving Services
8133 Social Advocacy Organizations
8134 Civic & Social Organizations
8139 Business, Prof., Labour & Other Member Orgs.
814 Private Households
8141 Private Households

91 Public Administration

911 Federal Government Public Administration
9111 Defence Services
9112 Federal Protective Services
9113 Federal Labour, Employment & Immigration Serv.
9114 Foreign Affairs & International Assistance
9119 Other Fed. Government Public Administration
912 Prov. & Territorial Public Administration
9121 Provincial Protective Services
9122 Provincial Labour & Employment Services
9129 Other Prov. & Terr. Public Administration
913 Municipal Public Administration
9131 Municipal Protective Services
9139 Other Municipal Public Administration
914 Aboriginal Public Administration
9141 Aboriginal Public Administration
919 Extra-territorial Public Administration
9191 Extra-territorial Public Administration

Appendix 9 – Two-digit 1980 Canadian Standard Industrial Classification (SIC) Codes

01	Agricultural Industries
02	Service Industries Incidental to Agriculture
03	Fishing and Trapping Industries
04	Logging Industry
05	Forest Services Industry
06	Mining Industries
07	Crude Petroleum and Natural Gas Industries
08	Quarry and Sand Pit Industries
09	Service Industries Incidental to Mineral Extraction
10	Food Industries
11	Beverage Industries
12	Tobacco Products Industries
15	Rubber Products Industries
16	Plastic Products Industries
17	Leather and Allied Products Industries
18	Primary Textile Industries
19	Textile Products Industries
24	Clothing Industries
25	Wood Industries
26	Furniture and Fixture Industries
27	Paper and Allied Products Industries
28	Printing, Publishing and Allied Industries
29	Primary Metal Industries
30	Fabricated Metal Products Industries (except Machinery and Transportation Equipment Industries)
31	Machinery Industries (except Electrical Machinery)
32	Transportation Equipment Industries
33	Electrical and Electronic Products Industries
35	Non-metallic Mineral Products Industries
36	Refined Petroleum and Coal Products Industries
37	Chemical and Chemical Products Industries
39	Other Manufacturing Industries
40	Building Developing and General Contracting Industries
41	Industrial and Heavy (Engineering) Construction Industries
42	Trade Contracting Industries
44	Service Industries Incidental to Construction
45	Transportation Industries
46	Pipeline Transport Industries
47	Storage and Warehousing Industries
48	Communication Industries
49	Other Utility Industries
50	Farm Products Industries, Wholesale
51	Petroleum Products Industries, Wholesale
52	Food, Beverage, Drug and Tobacco Industries, Wholesale
53	Apparel and Dry Goods Industries, Wholesale
54	Household Goods Industries, Wholesale
55	Motor Vehicle, Parts and Accessories Industries, Wholesale
56	Metals, Hardware, Plumbing, Heating and Building Materials Industries, Wholesale
57	Machinery, Equipment and Supplies, Wholesale
59	Other Products and Industries, Wholesale
60	Food, Beverage and Drug Industries, Retail
61	Shoe, Apparel, Fabric and Yarn Industries, Retail
62	Household Furniture, Appliances and Furnishings Industries, Retail
63	Automotive Vehicles, Parts and Accessories, Sales and Service
64	General Retail Merchandising Industries
65	Other Retail Store Industries
69	Non-store Retail Industries
70	Deposit-accepting Intermediary Industries
71	Consumer and Business Financing Intermediary Industries
72	Investment Intermediary Industries
73	Insurance Industries
74	Other Financial Intermediary Industries
75	Real Estate Operating Industries (except Developers)
76	Insurance and Real Estate Agent Industries
77	Business Service Industries
81	Federal Government Service Industries
82	Provincial and Territorial Government Service Industries
83	Local Government Service Industries
84	International and Extra-territorial Government Service Industries
85	Educational Service Industries
86	Health and Social Service Industries
91	Accommodation Service Industries
92	Food and Beverage Industries
96	Amusement and Recreational Service Industries
97	Personal and Household Service Industries
98	Membership Organization Industries
99	Other Service Industries

Appendix 10 – Two-digit 1987 U.S. Standard Industrial Classification (SIC) Codes

01	Agricultural Production Crops
02	Agriculutral Production Livestock
07	Agricultural Services
08	Forestry
09	Fishing, Hunting and Trapping
10	Metal Mining
12	Coal Mining
13	Oil and Gas Extraction
14	Non-metallic Minerals, except Fuels
15	General Building Contractors
16	Heavy Construction, except Building
17	Special Trade Contractors
20	Food and Kindred Products
21	Tobacco Products
22	Textile Mill Products
23	Apparel and Other Textile Products
24	Lumber and Wood Products
25	Furniture and Fixtures
26	Paper and Allied Products
27	Printing and Publishing
28	Chemicals and Allied Products
29	Petroleum and Coal Products
30	Rubber and Miscellaneous Plastics Products
31	Leather and Leather Products
32	Stone, Clay and Glass Products
33	Primary Metal Industries
34	Fabricated Metal Products
35	Industrial Machinery and Equipment
36	Electronic and Other Electric Equipment
37	Transportation Equipment
38	Instruments and Related Products
39	Miscellaneous Manufacturing Industries
40	Railroad Transportation
41	Local and Interurban Passenger Transit
42	Trucking and Warehousing
43	U.S. Postal Service
44	Water Transportation
45	Transportation by Air
46	Pipelines, except Natural Gas
47	Transportation Services
48	Communications
49	Electric, Gas and Sanitary Services
50	Wholesale Trade Durable Goods
51	Wholesale Trade Non-durable Goods
52	Building Materials and Garden Supplies
53	General Merchandise Stores
54	Food Stores
55	Automotive Dealers and Service Stations
56	Apparel and Accessory Stores
57	Furniture and Home Furnishings Stores
58	Eating and Drinking Places
59	Miscellaneous Retail
60	Depository Institutions
61	Non-depository Institutions
62	Security and Commodity Brokers
63	Insurance Carriers
64	Insurance Agents, Brokers and Service
65	Real Estate
67	Holding and Other Investment Offices
70	Hotels and Other Lodging Places
72	Personal Services
73	Business Services
75	Auto Repair, Services and Parking
76	Miscellaneous Repair Services
78	Motion Pictures
79	Amusement and Recreation Services
80	Health Services
81	Legal Services
82	Educational Services
83	Social Services
84	Museums, Botanical, Zoological Gardens
86	Membership Organizations
87	Engineering and Management Services
88	Private Households
89	Services, n.e.c.
91	Executive, Legislative and General
92	Justice, Public Order and Safety
93	Finance, Taxation and Monetary Policy
94	Administration of Human Resources
95	Environmental Quality and Housing
96	Administration of Economic Programs
97	National Security and International Affairs